Electric Mobility in India

India Smart Grid Forum
9TH March 2017
China driving global EV growth

### Key reasons for EV growth in China:

**Government push for electrification -**
- Aggressive government subsidies for BEVs at central and state
- Restrictions on purchase of ICE license plates
- Promotion of public mobility models using electrics - car sharing, car leasing for govt. officials, etc.

**Increasing charging Infrastructure development -**
- Govt. working towards “at least 1 pile per vehicle” & hence plans to have
- 12,000 centralized charging/battery swap stations
- 4.8 million scattered charging piles

---

#### China EV market - growth rate of >100% in 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Cumulative P-EV Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>715,000</td>
</tr>
<tr>
<td>2015</td>
<td>1,235,000</td>
</tr>
</tbody>
</table>

#### China public charging infra. growth rate of >450% in 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Public Charging Stations in China</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>1,251</td>
</tr>
<tr>
<td>2011</td>
<td>2,391</td>
</tr>
<tr>
<td>2012</td>
<td>2,551</td>
</tr>
<tr>
<td>2013</td>
<td>2,722</td>
</tr>
<tr>
<td>2014</td>
<td>3,941</td>
</tr>
<tr>
<td>2015</td>
<td>4,699</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>China, 1,766,277, 34%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>USA, 1,15,262, 22%</td>
</tr>
<tr>
<td></td>
<td>Netherlands, 43,971, 8%</td>
</tr>
<tr>
<td></td>
<td>UK, 28,188, 5%</td>
</tr>
<tr>
<td></td>
<td>Norway, 34,455, 7%</td>
</tr>
<tr>
<td></td>
<td>France, 27,701, 5%</td>
</tr>
<tr>
<td></td>
<td>Germany, 23,404, 5%</td>
</tr>
<tr>
<td></td>
<td>Japan, 21,000, 4%</td>
</tr>
</tbody>
</table>

---

Copyright © 2012 Mahindra & Mahindra Ltd. All rights reserved.
## Current electric vehicle market in India

<table>
<thead>
<tr>
<th>Electric 2 wheelers</th>
<th>Electric 3 wheelers</th>
</tr>
</thead>
<tbody>
<tr>
<td>~6.5 Lakh+ total cumulative electric two wheelers on road</td>
<td>~2.5 Lakh+ total cumulative electric 3 wheelers on road</td>
</tr>
<tr>
<td>Electric two wheeler market in India &lt;1 percent of two-wheeler market</td>
<td>Volumes largely in the un-organized market</td>
</tr>
<tr>
<td>More than 50 registered Chinese and local players</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electric 4 wheelers</th>
<th>Electric Buses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mahindra Electric is the only 4 wheeler manufacturer in the country with variants in hatchback, sedan, passenger and cargo mini-van</td>
<td>Multiple showcases and pilot done by various players such as KPI, JBM and BYD across the country</td>
</tr>
<tr>
<td>~3,500+ YTD units sold over various variants</td>
<td>~20 EV buses running as test pilots in India</td>
</tr>
</tbody>
</table>

### NMEMP 2020 Target: Deploy 5 - 7 million hybrid and electric vehicles in India by 2020

- ~6.5 Lakh+ total cumulative electric two wheelers on road
- Electric two wheeler market in India <1 percent of two-wheeler market
- More than 50 registered Chinese and local players

- ~2.5 Lakh+ total cumulative electric 3 wheelers on road
- Volumes largely in the un-organized market
- More than 50 registered Chinese and local players

### Inidan EV market far from achieving the 2020 target set by NMEMP
Opportunities for mass adoption in India

Are there ‘low hanging’ opportunities for electrification?

1. EVs have lower running cost
2. Low Total Cost of Ownership if high kms/day

Examples of commercial mobility models that see high kms/day

**City Taxis**
- ~5,00,000 taxis attached to online aggregators
- 200-250 km daily run
- Limited geography

**Metro Feeders**
- ~2,500 such vehicles for Delhi Metro alone
- 180-220 km daily run
- Fixed routes with fixed end points

**Corporate commute**
- 20 Lakh+ vehicle market across various categories
- 150-200 kms daily run
- Fixed routes with fixed end point

Is electrification of high mileage mobility models possible?
Our experience

- e2o being used as ‘taxi’ for employee commutes
- Each vehicle running ~200 kms/day with the help of fast charging and telematics data for fleet management
- Cumulative 5 million kms driven over 125 vehicles as of Nov’16

- eSupro mini-van being used for hyper-local grocery deliveries
- Each vehicle running ~80-90 kms/day
- Reduces Rs. cost per order when compared to similar ICE* mini-vans

Demonstrated that a complete EV mobility solution can meet high daily running requirements, reduce cost, optimize operations and offer value added services to end customers over existing ICE* based options.

*ICE – Internal Combustion Engine (petrol/diesel/CNG) vehicles
### Challenges for wider adoption

1. **Higher price and acquisition cost of electric vehicles**

2. **Presence of support eco-system - policies & subsidies**

3. **Parking and charging infrastructure availability**

4. **Availability of electricity and grid network**

5. **Awareness & Belief of electric vehicles**

6. **Attractive customer offerings of products**

7. **Availability of wide-spread service network**
Our recommendation for accelerated adoption

Pathways to EV adoption in India

Accelerated mass adoption of electric vehicles is possible through fleet applications that benefits from lower running cost

Government intervention

Encouraging industry through:
- Central and state policies favouring adoption of electric mobility - financial subsidies, non-monetary incentives and/or restrictions and penalties
- Large-scale setup of public and private funded charging infrastructure
- Better financing rates for adopters
- Pilot project funding for public and private projects

OEM investment

- Building solutions that suit customer requirements and easy adoption
- Exploring and incubating suitable applications for deployment
- Building awareness of technology
- Setting up wide spread service networks for after sales support

Focus on execution is the need of the hour

Copyright © 2012 Mahindra & Mahindra Ltd. All rights reserved.
THANK-YOU!