Path to Transformative Mobility

2015-17

FAME-India (National Mission on Electric Mobility)

2017

FAME-2

Phased Manufacturing Program

2019

7 C’s

Common

Connected

Convenient

Congestion-free

Charged

Clean Mobility powered by Clean Energy

Cutting-edge
FAME-2, Type EV: Shared, Connected

<table>
<thead>
<tr>
<th></th>
<th>Top Speed (kmph)</th>
<th>Acceleration (m/s²)</th>
<th>Range (kms)</th>
<th>Motor peak power (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>e-2W (L1 &amp; L2)</td>
<td>40</td>
<td>0.65</td>
<td>80</td>
<td>0.5kW to 1.5kW</td>
</tr>
<tr>
<td>e-3W (Rick)</td>
<td>NA</td>
<td>NA</td>
<td>80</td>
<td>1.5kW to 2kW</td>
</tr>
<tr>
<td>e-3W (Auto) (L5)</td>
<td>40</td>
<td>0.65</td>
<td>80</td>
<td>4.5kW to 6kW</td>
</tr>
<tr>
<td>e-4W (M1) (&lt;4m)</td>
<td>70</td>
<td>1.04</td>
<td>140</td>
<td>20kW to 40kW</td>
</tr>
<tr>
<td>e-4W (M1) (&gt;4m)</td>
<td>70</td>
<td>1.04</td>
<td>140</td>
<td>30kW to 90kW</td>
</tr>
</tbody>
</table>

Targets for rollout over next 3 years are

- 10 lakh two-wheelers under ₹1.5 lakh
- 5 lakh three-wheelers under ₹5 lakh
- 35,000 four-wheelers under ₹15 lakh
- 20,000 strong & plug-in hybrids under ₹15 lakh
- 7,090 electric buses priced up to ₹2 crore
Basic & Fast Charging Systems

- Charging Systems: Indian Standards IS-17017 series
  - IS-17017 Part-1: General Principles & Basic Charging
  - Fast Charging Systems: Part 23
  - Digital Communication for Fast Charging:
    - IS 17017-Part 24: DC only Fast Charging Systems
    - IS 15118: Combined Charging Systems
EV-Bay; Charging every time EV is parked
Fast Charging Systems

- Chademo
  - DC Only
  - Communication: CAN protocol

- Combined Charging System
  - AC & DC
  - Power Line Communication
Fast Charging Station

- Chademo - Japan
- Combined Charging System - Europe

Power Line Communication

CAN Communication

DC

AC
Temperature tolerance of Lithium ion Battery
Global: increasing battery & range

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Indian: Small EV
- Cars
- Buses
Scope of Standards

IEC 63110
IEC 15118
OCPP
or
Aggregator
Charging Station 
Management 
System
OSCP, 
OCHP, 
OICP, 
eMIP
Roaming/ 
Payment 
Gateway
Power 
Distribution 
Company

A

B

C

D

AC Supply/ DC Station
Charge Station Operator
Power Supply Company
Payment Clearing House (Roaming)
eMobility Service Provider

1
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9
Networking for Load Management

- AC EV-Bay: can help load management
- If connected via PLC to distribution utility system
- Standards: OCPP/Smart Meter? / IEC 63110
- Both Fast Charging Systems have V2G capability
EV Buses

Other Methods

Automated Charging Pantograph
For Per-Trip Fast Charging Station

Fast Charging Station (cooled connector)

Bus Rapid Transport Corridors can use Battery Swapping or Power lines
“Electric” Roads for induction charging

Electric re-charging Lane

Inductive charging Inverter Cabinet

BMS

Battery

Secondary Coil

Primary Coil

Communication

Power

Power & Comm.
Indian Standards by Bureau of Indian Standards (BIS)
   Electro Technical Division, Subcommittee no.51 (BIS ETD-51)

International Electrotechnical Committee – International Stds
   IEC Technical Committee 69 (TC-69)
   IEC Technical Committee 23 (TC-23) ..... 

India must participate in IEC Committees
   Develop & offer Light EV / Battery Swapping Standards
   Common Battery Component Standards?
   Influence International Standards development

Thank you for listening!