A small EV focussed eMobility Program
Distributed Charging Infrastructure

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Indian Standards for EV Charging
https://standardsbis.bsbedge.com/

Normal Power level (AC & DC)
Light EV (<7 kw) & Parking bay (7→22 kw)

High Power (Only DC)
DC Fast Station (50→200 kw) & eBus/ Trucks (200→500 kw)

Battery Swap (Charging outside EV in a dock)
Scooters, 3 wheeled Autorickshaw
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- Higher ambient temperature & monsoon weather
- Driving trips are shorter, roads rougher
- Smaller Vehicles, 2 wheeler, 3 wheeler, small cars, small goods transport,
- Large population of buses...

eMobility in Tropical Region

Annual Mean Temperature

- 80 °F
- 80 °C

-50 -40 -30 -20 -10 0 10 20 30

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India’s Transformative Mobility Program

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- Consumer Subsidy Program (till 2023)
  - Subsidy allocation Rs.8500 crores ($)
  - 1 million two wheelers. Slow pick up. Recently a big investment by Ola was announced; followed by other such announcements from leading manufacturers.
  - 300,000 three wheelers. Tender for 100,000 has been placed already.
  - Approx 5000 eBuses

- (Battery) Cell manufacturing program incentives
  - 50 GW in 10 years; subsidy Rs. 18,500 crores ($)

- Production linked incentives for components
  - Rs. 25,000 crores ($)
Batteries to be charged

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Charging systems

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Front-end Data
between EV & DC Charger control
the flow of power to match the Charge acceptance state of Battery

Back-end Data
for Authorization, Credentials, Tariffs, Schedules etc. Roaming, Assist Grid Management

- EV Charge Controller
- EV Inlet/ Cable Connector
- Cable carry data & power
- Plug & Socket at Charger
- Supply Point Charge Controller

- EV Smart Meter
- Modem/ BLE - Internet
- Mobile App
- Application Programming Interface
- Central Database
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1 AC & DC supply
- Power Level 1 (upto 7 kw): Light EV
- Power Level 2 (7→22 kw): Cars in Parking bay

2 DC only supply
- Power Level 3 (50→250 kw): DC Fast Wayside Station
- Power Level 4 (250→500 kw): eBus/Trucks Station

3 Interoperable battery
- Light EV Battery Swap (~1 kWh pack)
- eBus Battery Swap

4 Roaming & Grid Integration
- Networked EV Infrastructure
Handbook for EV charging deployment

- Indian Standards for EV Charging
  https://standardsbis.bsbedge.com/

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- Provide clear guidelines on effective planning, implementation and governance for right-sized EV charging
- To support state and local government authorities in planning and governance of EV charging
Distributed Charging System is possible

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HANDBOOK of ELECTRIC VEHICLE CHARGING INFRASTRUCTURE IMPLEMENTATION
General Requirements

Indian Standards for EV Charging
https://standardsbis.bsbedge.com/

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<table>
<thead>
<tr>
<th>#</th>
<th>EV Charging Systems</th>
<th>IS-17017-1: 2018</th>
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<td>Electromagnetic Compatibility</td>
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<tr>
<td>4</td>
<td>Electromagnetic Compatibility</td>
<td>IS-17017-21-2: 2019</td>
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</tbody>
</table>

- Basic Communication: AC Charging
  - Charging control process at start of charging & normal/emergency shutdown is managed through basic communication via the control pilot lines

- DC Charging
  - For DC Charging, the data signals are also exchanged via the control pilot lines

- Connection Systems
  - It specifies dedicated plugs/ socket outlets & vehicle connectors / vehicle inlets including mechanical, electrical, performance requirements & control means.
## Light EV Infrastructure

**Indian Standards for EV Charging**
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### Charging Infrastructure for Scooters & 3-wheelers | 8 Dec 2021

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<thead>
<tr>
<th></th>
<th>IS-17017-22-1: 2021</th>
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<tbody>
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<td>6 DC Charge Point</td>
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<td>7 LEV DC Connector</td>
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<tr>
<td>8 LEV Combined Connector</td>
<td>Draft expected</td>
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### Light EV can be charged anywhere
- Charge points in stores, roadside, apartments
  - Low Cost AC Charge Point from DST project at ARAI
    - Target Rs.4000/- Standard Published. Unique BLE.
    - Delhi Government tender for 30,000 units
  - DC Charge Points for Scooters & 3-wheelers
    - First time in the world, a specific DC system for LEV
    - Indian Standard for Protocol and DC Connector published.
### Power Level 2

**Parking bay/ Destination**

- **EV Car is best charged in the Parking**
  - Destination/ Parking Bay Chargers
    - Offices, Apartments, Malls or any parking area. Dozen or more parking bay with AC or DC chargers.
  - Single LT supply (upto 150 kW) to parking campus
    - Smart-Plugs; networked with a scheduling program to charge all the EV efficiencies.

- **Advantages**
  - Parking exists, LT connection has no additional cost
  - Network benefits
    - Easy to integrate Rooftop Solar Power. Features like Time of Day Tariff to help Grid management

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<td>Combined Charge Point</td>
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11/13  Charging Infrastructure for Scooters & 3-wheelers | 8 Dec 2021
High Power Chargers

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<td>13</td>
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<td>DC Communications (PLC)</td>
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<td>22</td>
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<tr>
<th>Power Level</th>
<th>43 kW</th>
<th>250 kW</th>
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<th>800 kW</th>
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<tbody>
<tr>
<td>AC</td>
<td>Single or Dual Gun</td>
<td>Single Gun</td>
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<td>Automated Connector Down Pantograph</td>
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<tr>
<td>DC</td>
<td></td>
<td></td>
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# Interoperable Battery: Replacable/ Swap

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## Light EV Battery Swap

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## Electric Bus Battery Swap

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<td>34</td>
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