80,00,000 + Lakh Operational Kms On Indian Roads
Olectra – Products & Operations
• Listed company Part of MEIL group
• Pioneer in identifying and bringing new power and transportation technologies to India
• Largest manufacturers of Polymer Insulators in India

• Crafted strong strategic partnership with BYD, World’s largest EV manufacturer, to bring revolutionary electric Buses to India in 2016
• Partnership provides access to entire BYD Bus product line.
• Providing complete solution including charging infrastructure
BYD AUTO – WORLD’S LARGEST EV MAKER

Headquartered in Shenzhen, China

Strategic Partnership for technology, sales & after sales support

130 Million of service bus miles worldwide

Proven Quality and Reliability worldwide

Present In
30+ COUNTRIES
&
150+ CITIES

BYD sold more than 60,000 buses all over the world
## K9 PREMIUM 12 MTR ELECTRIC BUS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kneeling Mechanism</strong></td>
<td>Differently abled and elderly people friendly</td>
</tr>
<tr>
<td><strong>Front &amp; Rear Air Suspension</strong></td>
<td>Increases convenience and comfort</td>
</tr>
<tr>
<td><strong>Monocoque Chassis</strong></td>
<td>In-wheel drive</td>
</tr>
<tr>
<td></td>
<td>Best-in-class features improves safety, comfort and reliability</td>
</tr>
</tbody>
</table>

- **Inter-city & Intra-city**
- **Kneeling mechanism for old & DA people**
- **Front and rear air suspension**
- **Disc brake with ABS**
- **Range up to 250 km**
- **4-5 hrs charging time**
- **39 passengers & driver**

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K7 MIDI 9 MTR ELECTRIC BUS

Air Suspension

Increases convenience and comfort

Monocoque Chassis
In-wheel drive

Best-in-class features improves safety, comfort and reliability

Intra-city
Front and rear air suspension
Disc brake with ABS

Range up to 200 km
2-3 hrs charging time
31 passengers & driver

Ebuzz K7

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K6 MINI 7 MTR ELECTRIC BUS

Air Suspension
Increases convenience and comfort

Monocoque Chassis
In-wheel drive
Best-in-class features improves safety, comfort and reliability

Intra-city & Feeder
Front and rear air suspension
Disc brake with ABS

Range up to 200 km
3-4 hrs charging time
22 passengers & driver

Ebuzz K6

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First ever commercially operated 9 meter Electric AC bus was launched in India by Olectra.

First ever 12 meter Electric AC bus was launched in India by Olectra at Hyderabad, Telangana.

The largest fleet of Electric buses were deployed by Olectra in Pune, 150 12 & 9 meter buses.

A total of 200+ Electric buses have been deployed in India by Olectra. Olectra will be deploying additional 150 No’s 12 meter electric buses in Nasik.
OLECTRA- BYD BUS TRIALS ALL ACROSS INDIA

Chandigarh
Delhi
Rajkot
Pune
Goa
Bangalore
Kolkata

Manali - Rohtang
Dehradun - Mussorie
Nainital
Agra – Lucknow
Hyderabad
Vijyawada
Tirupati
Puducherry
Buses Currently in Operation

- **Hyderabad**: 40
- **Himachal Pradesh**: 25
- **Pune**: 100+
- **Mumbai**: 20
- **Kerala**: 10
Buses Under Deployment

Nasik
150

Mumbai
25
DEPOT & CHARGING INFRASTRUCTURE

DEPOT

CHARGER & PACKAGE SUB-STATION

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BUS OPERATIONS IN INDIA

HRTC - Manali-Rohtang

TSRTC - Hyderabad

KSRTC - Kerala

BEST - Mumbai

PMPML - Pune

Nagpur
## Operations Details

<table>
<thead>
<tr>
<th>Details</th>
<th>9 Mtr</th>
<th>12 Mtr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of buses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pune</td>
<td>25</td>
<td>125</td>
</tr>
<tr>
<td>Hyderabad</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Himachal Pradesh</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Kerala</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Mumbai</td>
<td>46</td>
<td>0</td>
</tr>
<tr>
<td>Nagpur</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>
OPERATIONAL CONSTRAINTS – E BUS

BUS ROUTE ALLOCATION:

ROUTE ALLOCATION: The timing of different routes mapped are in such a way that there will be bunching in depot during outshedding. Since punctuality (early or late) is also a penalty clause, there are chaos in the schedule deliveries.

TRAFFIC JAM:

Traffic jam is every day problem, though it is not under penalty clause, revenue loss is incurred. The delays due this issue some times trips to be missed, which is inconvenient to public.

ELECTRICAL ISSUES

The power supply: The input current is varying which is effecting the charging time. The charging time crucial in this operation, which is directly linked to the schedules. The current consistency required to deliver the schedules in proper and better way.

DRIVERS

Drivers pay key role in this operation. There is a gap in demand vs supply, in this segment. New engineers are made abundantly, but not drivers. The drivers available are not upto the mark to suit, this generation of mobility. Hence there is a need to act on making drivers, create good working atmosphere to give a safe and comfort journey, as per the bus and its passengers.
For Maintenance, we have observed the constraints of capacity of depot. No of buses and the area allocated are not mapped. Once parking area is congested, maintenance will effect.

In general area required:
- For every 20 buses     1 acre
- For every 15 buses     1 inspection pit
- For every 2 pits        1 bay

In most of the depots, this demand is not being met, which effects the maintenance.
<table>
<thead>
<tr>
<th>TSRTC : KMS LOST</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charging Issue</td>
<td>0</td>
<td>86</td>
<td>172</td>
<td>169</td>
<td>0</td>
<td>0</td>
<td>427</td>
</tr>
<tr>
<td>Drivers</td>
<td>2352</td>
<td>3371</td>
<td>12852</td>
<td>3938</td>
<td>0</td>
<td>0</td>
<td>22513</td>
</tr>
<tr>
<td>Power Issue</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>501</td>
<td>0</td>
<td>0</td>
<td>501</td>
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<tr>
<td>Traffic Issue</td>
<td>348</td>
<td>0</td>
<td>610</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>959</td>
</tr>
</tbody>
</table>
Economic Feasibility of Electric Bus

• Fixed Cost of electric bus is significantly higher than comparable diesel bus while variable cost is significantly lower than diesel buses.
• Total Cost of Ownership of electric bus will be comparable with diesel buses when buses are utilized for more number of kilometers.
• To achieve higher daily run battery should be capable of running higher range in single charge.

Benefits of having higher single charge range:

• Achieve higher daily run, less incremental cost for STU’s as incremental operating (variable) cost is marginal for electric buses
• Cost Savings for intermediate charging Infrastructure
• Increased available operating time for buses
• Buses can ply on high distance routes, more flexibility for STU’s in deciding the routes
• Reduced battery replacement cost (Battery life is more)
• Less range anxiety in future when battery performance will degrade
Our Experience from the last 3 years of operations, in different terrains

- So far, in our experience, DEPOT charging is the most suitable option as it eliminates most of the unwarranted risks like;
- 1) Running out of the Charge suddenly, during peak/day time due to surge in traffic or unexpected longer waiting period or any other unexpected circumstances.
- 2) Not having Route flexibility.
  
  *Example: Our Charging infrastructure at Manali, which is meant for Manali-Rohtang Pas route during tourist season, is used to ply the buses upto Mandi during off-season.*
- 3) Cost of creation & maintaining of additional infrastructure in the terminals to the STU’s.
- Depot Charging is like the famous punch line, “Fill it-Shut it-Forget it”.
Few Challenges before STU’s

• Incentivising OEM’s to go for Long-range buses (minimum 200km/single charge) to address range anxiety and to address growing needs of Public Transportation
  - DHI has addressed this, by announcing VGF based on battery capacity. It encourages to go for longer range batteries.
• Remaining technology agnostic
• Arranging level playing field between Long-range buses and shorter-range buses;
• To devise bidding parameters to have a sustainable business model for both, STU’s as well as to OEM’s;
Challenges in the Bidding process

• Electric Buses induction is still in the nascent stages.
• FAME-II’s aim is to establish the Industry, eco-system and localization
• Any complex competitive bidding, will straightaway put the pressure on prices thus eroding the confidence on the sustainability of the industry and bankability of the project.
• This will have a cascading effect on the entire eco-system, where initial R&D & setup costs are high.
• The existing system of quoting Rs/Km is well established and less complex
Thank You