



भारत सरकार  
GOVERNMENT OF INDIA  
भारी उद्योग एवं लोक उद्यम मंत्रालय  
MINISTRY OF HEAVY INDUSTRY & PUBLIC ENTERPRISES  
भारी उद्योग विभाग  
DEPARTMENT OF HEAVY INDUSTRY  
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Ref. No. 12(27)/2015-AEI (6710)

Dated: 27.10.2015

To

As per list attached.

Sub: Minutes of the meeting held on 9.10.2015 on FAME India Scheme: Pilot Project for EV Buses in Delhi - reg.

Sir,

I am directed to forward herewith a copy of the minutes of the meeting held on 09.10.2015 under the chairmanship of Shri Ambuj Sharma, Additional Secretary, Department of Heavy Industry on FAME India Scheme: Pilot Project for EV Buses in Delhi for information and taking necessary follow up action.

Yours faithfully,

Encls: As above.

  
(Dinesh Pal Singh)  
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Copy to:-

- (i) PSO to SHI
- (ii) PPS to AS,DHI
- (iii) PS to Director(Auto),DHI
- (iv) Member (R&D), NAB

1. Dr. S.K. Jagwani, Sr. Director, MNRE
2. Shri Ruchir Gupta, Deputy Secretary, MNRE
3. Shri S. Mubashir, Member R&D, NAB
4. Shri Nishant Arya, JBM Auto
5. Shri Karthick A., Ashok Leyland
6. Shri Pavan Sachdeva, Sr. GM, Mahindra
7. Shri Vikas Ranjan Dahiya, DGM, Volvo Buses
8. Shri Saurabh Rohilla, Dy Dir, SIAM
9. Shri KK Gupta, JBM Auto
10. Shri Bharat Chawla, JBM
11. Shri Rakesh Razelan, JBM,
12. Shri B.D. Sharma, JBM
13. Shri Rakesh Sharma, Alfa Bravo Motors

**FAME India Scheme: Pilot Project for EV Buses in Delhi.**  
**Meeting held on October 9<sup>th</sup>, 2015 in Udyog Bhawan, New Delhi.**

**List of participants:**

1. Shri Ambuj Sharma, Additional Secretary, DHI
2. Dr. S.K. Jagwani, Sr. Director, MNRE
3. Shri Ruchir Gupta, Deputy Secretary, MNRE
4. Shri S. Mubashir, Member R&D, NAB
5. Shri Dinesh Pal Singh, US, DHI
6. Shri Nishant Arya, JBM Auto
7. Shri Karthick A., Ashok Leyland
8. Shri Pavan Sachdeva, Sr. GM, Mahindra
9. Shri Vikas Ranjan Dahiya, DGM, Volvo Buses
10. Shri Saurabh Rohilla, Dy Dir, SIAM
11. Shri KK Gupta, JBM Auto
12. Shri Bharat Chawla, JBM
13. Shri Rakesh Razelan, JBM,
14. Shri B.D. Sharma, JBM
15. Shri Rakesh Sharma, Alfa Bravo Motors

The meeting was chaired by Shri Ambuj Sharma, Additional Secretary, DHI.

2. Chairman mentioned that this meeting is to discuss options for introducing electric buses in India, beginning with New Delhi and other metros. He said that Trolley buses may not be feasible in most Indian cities, except for particular locations like Kolkata where the infrastructure for Tram-Cars exist, or in specific locations like in Mumbai where the local administration may find it convenient, given the logistics present there. If there are any such specific proposals, they can be considered for those locations, as and when received.
3. In general, the cost of the Electric Drive is a big deterrent to their large scale introduction in India. So the following proposals are under consideration:
  - 3.1. In the case of **EV Buses that carry on-board energy storage devices**, there are two options to consider
    - a) **EV Bus Option-1:** Battery provision for a full day driving range of say 120 to 200 km (in conjunction with fast charging) for which ready solutions are available and can be deployed in 6 months to a year. However, their high cost is an inhibiting factor; and the STU's do not see a compelling reason to shift to electric buses, inspite of favorable Total Cost of Ownership estimates, considering an operational life of 10 to 15 years for the EV Buses.

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- b) **EV Bus Option-2:** On board battery with 50-75 km range battery, which would cover most bus-trip-lengths in the country adequately, with a provision for intermittent fast charging enroute, using pantograph at the Bus Stops-Terminal/ Beginning of the Trip. It has the clear advantage of lower EV-Bus cost, and the STUs are more likely to accept it, if the en-route charging infrastructure can be developed. Although this configuration is under trials in several countries, it is a model that is still to be established. Hence, such a project needs to be considered under the FAME India R&D Scheme.
- 3.2. In the case of Hybrid-electric Buses, the Mission has already announced the consumer incentives scheme, which was further improved recently for the HEV Buses. However, the sales will be slow to pick up due to the high cost; so as an interim measure the large population of existing Diesel and CNG buses could be retrofitted with Hybrid-Kits by the Bus Manufacturers themselves in collaboration with technology providers if needed.

**4. The Chairman requested the views of the Bus Manufacturers, MNRE and DTC in this regard.**

The MNRE joined the detailed discussions, to seek clarifications and to discuss specific assumptions. The Tata Motors representative could not join this meeting, but they have conveyed their inputs through the SIAM forum.

**Discussion on EV Buses**

5. **Volvo:** The company is serious about introducing electric-drive buses in the country, and has made definite plans for hybrid-electric buses, beginning with user trials like the 5-HEV Bus order from Navi Mumbai to be delivered by January 2016. Volvo will conduct 6 months intensive trials to learn about the issues in the Indian situation, and plan for commercial sales by the end of 2016 to the STUs. Regarding the full EV Bus, it was informed that Volvo is testing EV Bus Option-2 at their headquarters in Gottenburg, using pre-trip pantograph quick charging and the technology trials are still underway. So, the company has not firmed up commercial plans in this regard.
6. **Mahindra:** The company is keenly interested to enter the 9-meter long bus segment and implement both Hybrid and Electric Buses; however the plans are still in the initial stages.
7. **Ashok Leyland:** ALL has explored the following options so far: (a) Importing EV Buses from their UK based subsidiary company; however this did not take off due to the high acquisition cost for the EV buses; and (b) Development of suitable lower cost hybrid electric buses for the country. The latter program is well underway, and will take another 6 months to mature.
8. Ashok Leyland is not interested to introduce EV Buses in the Premium Segment (considering their experience so far) & would rather develop and deploy buses with wider acceptance. It was pointed out by them that there is considerable risk for any Bus Manufacturer to introduce full electric buses in

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the tropical & varied climatic conditions in India. So it will be necessary to undertake detailed assessment and statistical analysis; in order to avoid a situation leading to brand-erosion through a hasty introduction of EV-buses and potential customer service problems. The Company plans to conduct these studies and bring out 5 prototype 'indigenous' design semi-low floor buses in about 18 months, aimed at the appropriate price point for the mass market. They also informed that the SIAM's Frontier Technology Group is developing an R&D Consortium Project with the participation of all major Bus Manufacturers in India for specifically undertaking the required assessment studies and technology development activities, in a common forum.

9. **JBM:** The JBM has established a capacity of producing 2000 EV buses/ year, mostly in the Premium Segment. However, they are yet to complete the homologation process. The JBM EV Bus has already found acceptance in NOIDA where a commercial contract for half dozen EV buses is under consideration. The company has developed a detailed project proposal for deploying 100 buses in Delhi, along the Ring Road, as per the EV-Bus Option-1 mentioned above, wherein enroute charging and reduced battery size are the key methods employed by them to bring down the costs to that equivalent to current Hybrid Buses on offer in India. JBM informed that the enroute chargers will utilize pantograph connectors for ease of operations. This proposal will be presented separately to the DHI for consideration under pilot projects.
10. The Chairman emphasized that charging infrastructure, using Pantographs, can look for existing/ mature commercial offerings, or may need to be developed for the local conditions, in a fashion that all bus manufacturers should be able to utilize it in those routes.

#### **Discussion on Retro-fit Hybrid Kits for Existing Bus Fleets**

11. Ashok Leyland was of the view that Retrofit of existing bus fleets in the private sector can be attempted easily. Whereas the STU fleets pose a difficult problem due to 'creeping' (open ended) contractual arrangement where the company may end up with larger than expected liabilities. If this issue can be addressed adequately, then the Retrofit Kits can be looked at as a serious business plan for wider penetration of electric-drive buses.

1. The Chairman emphasized that Retrofit Hybrid Electric Kits for Existing Bus Fleets can be deployed by the Bus Manufacturers themselves, since currently they are responsible for the upkeep of the STU fleets through dedicated AMC arrangements. The DHI will formally write to Tata Motors and Ashok Leyland in this regard. The DHI will also request ASRTU to take the following actions to facilitate this activity:

- to estimate the potential population of candidate buses for such HEV-retrofit (of 1 to 6 years 'age') &
- to sort out the contractual issues involved in HEV-Retrofit Buses, with STUs & OEMs.

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### 13. Recommended Actions

- 13.1. Since the JBM has expressed interest in joining the NMEM Technology Program and have innovated with fully low floor & monocoque bus chassis, it was recommended that they may be invited to join the TAG-EM deliberations on technology programs for E-Buses.
- 13.2. An emphasis has to be given to the deployment of Electric Drive Buses by large corporates - both HEV and EV buses; particularly the latter for their daily employee commute. Some solution providers have already emerged in this regard. In this meeting, we have already discussed how to bring down the cost of the EV buses by utilizing pre-trip or enroute charging using pantographs; and the corporate sector may be requested to actively encourage such deployments. The infrastructure issues can be addressed jointly with the utility companies, since the requirements are for specific routes and defined time schedules.
- 13.3. The issues with regard to the Pantograph-based fast charging needs to be taken up on urgent basis. The availability of suitable options, their local production, AMC for pantograph & bus together, ownership & deployment issues etc need to be studied and specified. For this purpose, we must plan for a fleet of buses in Delhi, run by DTC, to estimate the Life Cycle Costs involved in this new, highly infrastructure linked and comparatively economical EV Bus Deployment Option. The model derived from this exercise in Delhi should be useful for quick replication and scaling up across several urban locations in India.
- 13.4. SIAM was requested to undertake a Total Cost of Ownership analysis, so that it can be considered for developing a suitable consumer-incentive structure for E-Buses (all options) under the FAME scheme.

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