



Case Studies in Low Carbon Urban Development in India

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Adopting E-Buses in Municipal Transport: A Case from Pune

Introduction

Pune is Maharashtra's second largest urban area and is governed by Pune Municipal Corporation (PMC) which was set up in the year 1950. It has a population of 3.37 million and the Pune Urban Agglomeration with neighbouring urban local bodies of Pimpri and Chinchwad (PCMC) totals 5.05 million inhabitants. In 2015, PMC and its surrounding area including the city of Pimpri-Chinchwad was designated as a metropolitan region (PMR) and Pune Metropolitan Region Development Authority (PMRDA) was formed for creating a detailed Masterplan of the Pune region. Pune Mahanagar Parivahan Mahamandal Limited (PMPML) is the apex body which runs the municipal bus service in the cities of Pune and Pimpri Chinchwad and was created in October 2007 by merging the erstwhile Pune Municipal Transport (PMT) and Pimpri Chinchwad Municipal Transport (PCMT). In the year 2021-22, PMPML's total fleet of buses of buses stood at 2121 buses while 1603 buses were on road each day plying on 379 bus routes covering 3974 bus stops. PMPML is one of the India's largest municipal transport services.

In the year 2021 the state of Maharashtra issued an EV Policy which had a specific objective of converting at least 25 per cent of public transport vehicles in 6 major cities in the state by the year 2025. It also declared a subsidy of INR 20,00,000 (~USD 24500) per E-bus up to 1000 buses for state transport undertakings. Adhering to the state government directive PMPML has decided to meet the target of bringing in 430 electric buses into its fleet. Currently 220 e-buses are already plying in PMC and PCMC area on 18 routes including one Bus Rapid Transit (BRT) route. PMPML has also constructed 5 e-bus depots with charging infrastructure at Pune Station, Nigadi, Wagholi, Baner and Bhekrai Nagar with more than 200 charging points.

Pune is a frontrunner in reaching the objectives of the EV policy as well as in mainstreaming low-carbon solutions, and therefore is a unique case of speedy and efficient e-bus adoption by a municipal bus service.



Charging Infrastructure at Pune Railway Station Depot



E-Bus Depot near Pune Railway Station



Low-Carbon Impact

E-buses are set to replace an equal number of existing diesel buses which reduces the PMPML's reliance on fossil fuels, specifically diesel directly resulting in air-pollution reduction at the city level. Adoption of e-buses could potentially reduce PM_{2.5} and carbon-dioxide emissions. Such savings when calculated for a fleet of 650 E-buses are to the tune of 1.2 tonnes of PM_{2.5} and 96,000 tonnes of CO₂ emissions over its lifetime.

Institutional Enablers

It is important to understand the institutional stakeholders for the PMPML's e-bus adoption to get an essence of the efficient arrangements which enabled its fast-paced implementation. The Government of Maharashtra acts as an overarching institution which provides the policy direction and framework at the state level for all the six major cities (Mumbai, Pune, Nagpur, Amravati, Aurangabad, and Nashik) of Maharashtra. At the local level in PMC and PCMC area both urban local bodies (ULBs) are responsible for the functioning of PMPML and are major financial contributors in terms of viability gap fund for operational costs of PMPML. 60 per cent of the viability gap fund is paid by PMC while the rest is paid by PCMC. Both ULBs also take responsibility of providing land for construction and operation of all bus depots and bus stops which are then operated by PMPML. As most e-bus depots require installing high tension electricity cables a handholding by Maharashtra State Electricity Distribution Company Limited was required to extend high tension power cables of 11kv to two depots of Nigri, and Bekhrai Nagar. Central Institute of Road Transport (CIRT) in the capacity of technical advisor provided its support in the RFP and bidding process. All these institutions through enablement by political actors at both national and state level were able to create structured governance mechanisms to achieve the goal of e-bus adoption.

Pune Smart City Development Company Limited (PSCDCL) provided the demand incentive through Government of India's FAME scheme to the operator. In total 3 RFPs were floated for acquiring 650 buses out of which 2 RFPs were under 1st phase of FAME scheme and the third was launched under the 2nd phase of the scheme with enhanced demand incentives.

Financial Enablers

The Government of India launched the second phase of Faster Adoption and Manufacturing of Electrical Vehicles in India (FAME) scheme for the promotion of electric mobility in the country. The scheme has two major components of providing demand incentives and setting up charging infrastructure. Electric buses are eligible for receiving these demand-based incentives of up to INR 20,000 per KWh, although final amount of subsidy depends competitive OEM bidding. Another condition for these demand-based incentive is that it would be provided only for operational expenditure (OPEX) model through State/City Transport Corporations (STUs). The OPEX model ensures that the cost of ownership of buses is not placed on city bus utilities. It is a unique Public-Private Partnership (PPP) model where city bus utilities pay a fee per kilometre to a private operator who is responsible to procure, operate and maintain the buses while the scheduling, route-planning and fare collection is managed by the utilities themselves. At the national level FAME has been the greatest financial enabler for the process of adoption of e-buses in Pune.

In the case of Pune, this demand incentive to the tune of INR 125 Crores (~USD 14 million) for 500 e-buses; INR 50 lakhs (~USD 61 thousand) per bus; was paid by PSCDCL through the FAME scheme to the chosen operator BYD-Olectra. PMPML decided to pay INR 40.32/km for 9m long buses and INR 58.50/km for 12



m long buses to the operator excluding electricity charges which PMPML will directly pay to MSEDCL based on energy use by the charging infrastructure.

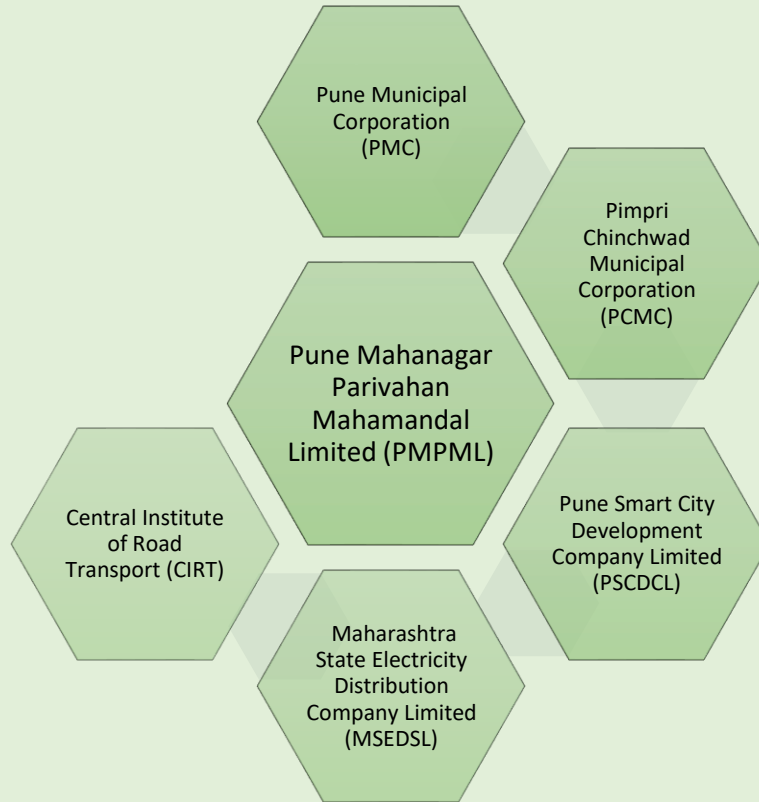


Figure: E-Bus Adoption Stakeholders



PMPML E-Bus with FAME Logo



E-Bus Charging Points at Depot



Learnings for Cities

There are three key learnings for the Indian cities which wish to adopt e-buses as a part of their own municipal bus systems.

1. Planning for long-term: Pune's strategy of looking ahead and adhering to the lofty targets of the Maharashtra government's EV policy 2021 enabled them to plan for the future of the city's bus service. Other cities in India can also start planning for a more longer-term vision for the city's bus service and adoption of e-buses. Although it would require creating better leadership on both political and executive front, a structured plan, an understanding of available financial resources and better monitoring processes. A switch from traditional bus service to e-bus service will also require a steady commitment and cooperation in between all the actors in the city to achieve better results.
2. Institutional Networks: PMPML was able to create a goal and a consensus to reach that goal amongst all the institutional actors which had diverse interests. It was able to mobilise their diverse strengths through creating working groups and interdepartmental committees with regular meetings ensuring time-bound outputs. All the consultants and collaborators were given clear responsibilities and goals. Any city in India looking for e-bus adoption in an effective manner will have to work with diverse stakeholders towards a single goal and will have to make use of state and central government policies and directives, specifically in terms of financial subsidies effectively.
3. Reforms: PMPML had a history of procuring buses through Gross Cost Contract (GCC)/OPEX model and experience in dealing with private bus partners and operators and monitoring them for service standards. Still, while dealing with RFPs of e-bus procurement they took help of expertise and advice from institutions in the private sector to fine-tune their strategy. This ensured speedy implementation of the initiative. As OPEX model is also recommended by Government of India's FAME guidelines as well and is vital for receiving demand-based subsidies, it would be crucial for all Indian cities to shift from the strategy of high capital investment in procuring buses to that of an OPEX model. It will require better standards of supervision and monitoring to maintain service standards.

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