



---

# Accelerating Procurement, Operations and Financing of Buses through Public-Private Partnership

# **Accelerating Procurement, Operations and Financing of Buses through Public-Private Partnership**

**September 2023**

**Prepared by**

Association of State Transport Undertakings (ASRTU)

**with support from**

Institute for Transportation & Development Policy (ITDP)

**ITDP Team:**

Aditya Rane | Ravneet kaur | Vaishali Singh | Sivasubramaniam Jayaraman

# Table of Contents

<b>1. Preface</b>	<b>3</b>
<b>2. Need for PPP In India</b>	<b>6</b>
<b>3. Critical Factors for Pursuing a Public-Private Partnership (PPP) Contracts</b>	<b>9</b>
3.1 Essentials of PPP Contract	9
3.2 Ethical Questions in PPPs	10
3.3 Challenges in Financing	10
3.4 Challenges in Choosing the Right Model	11
3.5 Factors Affecting Cost per Kilometer	16
3.6 Challenges in Implementing IT-Based Buses	16
3.7 Challenges of Adopting Electric Buses for private operators	17
3.8 Responsibility and Ownership	19
Recommended Organizational Structure for E-Bus Operation on PPP Model	21
Figure 8 : Proposed Organizational Structure for E-Bus PPP Operation	22
3.9 Selection of Operators	23
<b>4. Learnings from PPP experience in India</b>	<b>24</b>
4.1 Case Study 01: APSRTC's Bus Hiring Scheme	24
4.2 Case Study 02: TSRTC's Pricing Model and Adoption of Electric Buses	28
3.3 Case Study 03: DIMTS Revolutionizing Public Transport	30
3.4 Case Study 04: UPSRTC Innovative Schemes	35
3.5 Case Study 05: MSRTC's learnings from past experience and procurement of Electric Buses under PPP	38
3.6 Case Study 06: Successful PPP Model for bus operations by BMTC	41
3.7 Case Study 07: Enhancing Public Transport in Kerala: Exploring the Role of Private Operators and Accelerating Bus Procurement and Operations	43
3.8 Case Study 08: Transforming Public Transportation: A Case Study of Kalyan Dombivali Municipal Transport Undertakings (KDMTU)	45
3.9 Case Study 09: Enhancing Efficiency and Sustainability in Public Transport: A Case Study of Pune Mahanagar Parivahan Mahamandal (PMPML)	46
<b>4. Impact of Aggregation of E Buses through PPP in India</b>	<b>50</b>
4.1 CESL's Demand Aggregation Model	51
4.2 National Electric Bus Program: Aggregation without subsidy	53
<b>5. Issues and challenges in Financing Public Buses through PPP in India</b>	<b>54</b>
5.1 Overcoming Financing Challenges in Public Transport	54
5.2 Strategies for Financing Buses in India	56
5.3 World Bank Financing Instruments and Preparing a Project Report for Development Finance Institutions	57
<b>6. Recommendations</b>	<b>61</b>
<b>Annexure</b>	<b>64</b>

# 1. Preface

Public-Private Partnership (PPP) in bus operations has significant potential to enhance the service quality, financial viability, and operational efficiency of State Transport Undertakings (STUs) in India. It also provides a means to expand the bus fleet and improve the overall transport system. This paper explores the potential of Public-Private Partnership (PPP) in accelerating the procurement, operations, and financing of buses to enhance the service quality, financial viability, and operational efficiency of State Transport Undertakings (STUs) in India. The objective of this study is to shed light on the challenges and opportunities associated with PPP-based bus operations and provide recommendations for improving the overall transport system.

To gain a deeper understanding of the intricacies surrounding PPP-based bus operations, the Association of State Transport Undertakings (ASRTU), in partnership with the Institute for Transportation and Development Policy (ITDP), jointly organized a workshop titled "Accelerating Procurement and Operations of Buses through Public-Private Partnership" in New Delhi on 5th April 2023. The workshop aimed to gather insights, challenges, learnings, and recommendations from diverse stakeholders in the public transport ecosystem.

The workshop brought together key stakeholders, including Managing Directors and General Managers of multiple STUs, private bus operators, original equipment manufacturers, researchers, academicians, and World Bank and KfW from development finance institutions. By facilitating discussions on contracting structures, emerging trends, and innovative solutions, the workshop explored ways to enhance public transportation by making it more efficient, affordable, and financially sustainable through robust PPP frameworks.

The workshop was divided into four sessions, each focusing on different aspects of PPP-based bus operations. Session one focused on the learnings from a few PPP best practices followed by STUs nationwide. It highlighted the significance of sustained price discovery, timely payments, and safety measures to ensure effective service delivery for STUs. The session recognized the potential of a comprehensive approach to successfully deploy electric buses under PPP, thereby promoting a sustainable and efficient transport system.

Session two underscored the key issues with current contracting structures and discussed the importance of addressing ethical concerns, selecting appropriate models, and considering factors beyond cost for successful PPP implementation in the transportation sector. The need for sustainable partnerships between public and private players was emphasized by the OEMs and private operators, along with other key success factors like the practicality of the contracts and strong leadership to manage contracts and ensure the sustainability of all stakeholders.

Session three discussed the way ahead for PPP and the role of national agencies in scaling-up PPP contracting in India. Adequate support and funding from the government, adherence to concession agreement terms by private players, and addressing challenges related to cost per kilometer, financing, and charging infrastructure were identified as key



factors. The session also stressed the need for a nodal agency for electric buses to enhance project sustainability. Moreover, it was suggested that STUs should take a more managerial role in planning public transportation while entrusting day-to-day operations to private operators to achieve better efficiency. State governments were encouraged to prioritize public transport and explore private sector involvement to position India as a global leader in electric mobility for buses.

Session four focused on the significance of financial planning for successfully deploying electric bus projects. It highlighted the necessity of explicit planning for capital expenditure and operating expenditure together through a comprehensive approach, leveraging Transport Funds, transforming STUs into authorities, and providing incentives such as capital incentives, taxation benefits, and access to finance at lower interest costs. Digitization of STUs was identified as a means to improve the bankability of projects by ensuring greater contract transparency.

To summarise, this paper encapsulates the best practices, critical issues and challenges, and recommendations discussed during the workshop to accelerate procurement, financing and operations of buses using PPP. It emphasizes the importance of restructuring STUs to take the role of planning and decision-making authority, while handing over the day-to-day operations to the private sector which is able to perform those functions efficiently. It also discussed leveraging the procurement of electric buses to meet the growing demand for public transport while fostering sustainable mobility.

Sessions	Key Speakers
What is happening in PPP in public transport in India?	<ul style="list-style-type: none"> <li>● Mr Dwaraka Tirumala Rao, IPS, Managing Director, APSRTC</li> <li>● Mr. Vishal Kapoor, IRS, CEO, CESL</li> <li>● Mr C.K Goel, Senior Vice President (Road Transport) at Delhi Integrated Multi-Modal Transit System Limited (DIMTS)</li> <li>● Mr. Atul Jain, GM, UPSRTC</li> </ul>
Issues with Contracting	<ul style="list-style-type: none"> <li>● Mr Surya Sen, IFS, Director IT, BMTC</li> <li>● Mr Suresh Chettiar, Sr VP- Bus Business, Volvo Group India Pvt Ltd</li> <li>● Mr Nishant Arya, Vice Chairman &amp; MD, JBM Auto Ltd.</li> <li>● Mr Tito Varghese, Chief Operating Officer, Antony Road Transport Solutions Private Ltd, Private Operator for DIMTS</li> <li>● Mr Mohammad Afzal, Parveen Travels, Private Operator for BMTC</li> </ul>
How to accelerate the adoption of public buses through public-private partnership?	<ul style="list-style-type: none"> <li>● Mr Paresh Goel, Director, MoRTH</li> <li>● Mr Biju Prabhakar, IAS, Transport Secretary, Kerala and MD KSRTC</li> </ul>

	<ul style="list-style-type: none"> <li>● Mr Shekhar Channe, IAS, Vice President, ASRTU; VC - MD MSRTC</li> <li>● Ms Archana Chauhan, Lead-National Electric Bus Program, CESL</li> <li>● Prof. Shivanand Swamy, Executive Director, Centre of Excellence in Urban Transport, CEPT University</li> <li>● Mr Deepak Sawant, General Manager, KDMTU</li> </ul>
Issues and challenges in Financing of Public Buses through PPP in India	<ul style="list-style-type: none"> <li>● Ms Swati Khanna, KfW</li> <li>● Mr Ravi Gadepalli, World Bank</li> <li>● Dr. V.Ravinder, IPS, IGP Retd. Chief Operating Officer, TSRTC</li> <li>● Mr Prasanna Patwardhan, President, BOCI</li> <li>● Mr. Vivek Sahni, Chief Financial Officer, GreenCell Mobility</li> </ul>

*Table 1: List of Key Speakers and Contributors*

## 2. Need for PPP In India

Buses are the fundamental mode of transportation for the country's urban and rural populations, serving as the backbone of mobility. In 2019-20, STU buses carried 3.67 crore passengers per day in rural areas and 2.03 crore passengers in urban areas<sup>1</sup>. In addition to public buses, the demand for public transportation is significantly amplified by private buses, which cater to a substantial number of passenger trips. For instance, private stage carriage permit buses alone transport approximately 1.5<sup>2</sup> crore passengers per day. It is important to note that only 8% of the total bus fleet is being operated by STUs. The remaining 19 lakh buses are held by the private sector, but only 29% of these buses have a valid permit to operate. This highlights the immense volume of passengers relying on buses to meet their daily transportation needs. However, despite the higher dependence on public transport, public buses have remained stagnant since 2011, while the urban population has grown by 24%. This has led to a significant decline in the reliability of bus services, with overcrowding becoming a prevalent issue due to the unavailability of sufficient buses. According to a survey conducted under MoHUA's Transport4All Challenge, 65% of people across 43 Indian cities have raised concerns about the unreliability and overcrowding of bus services<sup>3</sup>. The situation calls for immediate attention and action, as the demand for public transport will only increase with urbanization and the growing population.

In the post-covid scenario, the significant surge in personal vehicles on the roads has led to a severe space crunch, making it challenging to provide enough road space for them. As per Tomtom Traffic Index, Indian cities have always topped the Global most congested cities. In 2021, Mumbai, Bengaluru and Delhi were ranked as the world's 5th, 10th and 11th most congested cities. While in 2022, Bengaluru and Pune were ranked as 2nd and 6th most congested cities in the world. To mitigate this situation, there is an urgent need to increase the number of public transport options, especially buses, in most cities and rural areas. As of 31st March 2022, the number of buses serving urban and rural areas is only 1,46,355<sup>4</sup> under the public sector, making it available only 10 buses per lakh population and around 1.9<sup>5</sup> lakh private buses are operated on stage carriage permits, making the availability of around 14 buses per lakh population. In total, the existing availability of buses is around 24 (public and private) buses per lakh population - is significantly less than the national and international standards on bus service provision i.e. 40-60 buses per lakh population<sup>6</sup>. MoRTH suggests that there is a need to induct around three lakh buses into the public transport system. However, private operators and State Transport Units (STUs) struggle to raise the necessary finances to add more buses to their fleets. In a bus-based public transport system, farebox revenue is often inadequate to recover full

---

<sup>1</sup> STUs Profile and Performance, 2019-20, CIRT and ASRTU

<sup>2</sup> Are Electric Buses a Viable Business Proposition by SGA, CEEW & ITDP India

<sup>3</sup> Analysis of Public Transport Needs in Indian Cities A Publication on Findings of Transport4All Stage-1 Surveys, 2021.

<https://smartnet.niua.org/transport4all/a-comprehensive-analysis-of-public-transport-needs-in-indian-cities/>

<sup>4</sup> Handbook on Fleet by STUs in India by ASRTU

<sup>5</sup> Bus and Car Operators Confederation of India (BOCI) Database

<sup>6</sup> National Investment Programme for Bus-based Public Transport in India, WRI, May 2021

costs due to the service obligation to maintain connectivity even during less demand at affordable prices. In most cases, fares are decided by state governments under powers granted to transport departments or commissioners under the Motor Vehicles Act. This means that STUs have limited revenue-side flexibility, which can further compound their financial challenges.

The STUs face a significant challenge in terms of cost recovery; as per the 2019-20 CIRT Report STUs could recover overall total cost up to 74% from the total revenue (including subsidies, reimbursement of fare concessions and non-traffic revenue), leaving 26% of the total cost uncovered resulting in a net loss of ₹ 19,726 crores.

Sl. No.	Name of the State Road Transport Undertaking (STUs)	EPKM (₹)	CPKM (₹)	Viability Gap
1	BEST Undertaking	51.72	141.34	-89.63
2	Bangalore Metropolitan TC	52.15	65.66	-13.51
3	Telangana SRTC	48.53	65.36	-16.83
4	Uttar Pradesh SRTC (P)	33.31	32.27	1.05
5	Delhi TC	30.00	90.00	-60.00

Table 2: Example of Financial Viability of a few STUs in India 2019-20 and ASRTU<sup>7</sup>

To address the stagnant growth in STUs/SPVs' fleet size to meet the growing demand, the following recommendations can be considered:

1. Central and state governments should increase budgetary support to procure buses both for augmentation and replacement of the old fleet.
2. Estimation of Viability Gap Funding for the entire project period and fixed annual budgetary provision to cover it from local/state/central govt.
3. Creating an apex body to monitor and promote public-private partnership (PPP) as a model to increase buses without capital investment
4. To reduce OpEx and CapEx, the government should reduce the tax burden on fuel, GST, and toll tax for STUs. These strategies can help reduce the viability gap requirement and fuel investment hence reducing the burden on the government, especially with the expansion of the fleet.

PPP can also be a viable solution to improve financial efficiency and increase the number of buses on the roads. For example, the Department of Heavy Industries, Government of India, facilitated the procurement of 2,500 electric buses for 16 different STUs by implementing the Gross Cost Contract model and offering demand subsidies under the FAME II scheme. As of 2022, an additional 5,450 electric buses are currently in progress. By doing this, DHI was able to reduce the prices of buses by 31% as compared to diesel and 27% as compared to CNG buses. This would not only improve the accessibility and reliability of public transport but also reduce carbon emissions and promote sustainable development. A robust PPP model could help increase the number of buses on the roads,

<sup>7</sup> STUs Profile and Performance, 2019-20, CIRT and ASRTU

especially in areas with inadequate public transport infrastructure. Developing a model PPP contract specific for different city sizes and leveraging the procurement of electric buses could be an ideal way to meet the rising demand for public transport while promoting sustainable mobility.



### **3. Critical Factors for Pursuing a Public-Private Partnership (PPP) Contracts**

The fleet size of State Transport Undertakings (STUs) in India has remained stagnant over the past 5-6 years at 1.3 lakh public buses<sup>8</sup>, despite a growing demand for public transportation. According to the Ministry of Road Transport and Highways, there is a requirement for approximately three lakh buses to be inducted into the public transport system to meet the needs of the population. Drawing a comparison between Delhi and London, it is evident that Delhi, with a population of 3.17 crores, has only around 7-8 thousand buses and a 400-kilometre metro network, while London boasts of a 1000-kilometre tube network and around 9000 buses, despite having a population of 0.96 crores. This highlights the need for significant improvement in public transport infrastructure in India.

Public-private partnerships (PPPs) are becoming increasingly prevalent in India's transportation sector. PPPs were initially used in highway toll plazas, but they are now being used in the public transport sector for operations and infrastructure development. These partnerships allow for efficient market-based mechanisms, shifting investment and performance risks towards the private sector. By 2022, nearly 14% of the State Transport fleet was operated through the PPP model, i.e. 20,000 buses, of which 2,500 are electric buses<sup>9</sup>.

#### **3.1 Essentials of PPP Contract**

Procurement and operations are two distinct areas of focus that require different perspectives and approaches from the government to improve public transportation in India. This chapter highlights the critical factors that must be considered to make public-private partnerships (PPPs) successful, including ethical questions around labour welfare, job security for contractors, and choosing the right model.

Public-Private Partnerships (PPPs) have the potential to bring private investment and expertise into the transportation sector and improve the quality of services provided by State Transport Undertakings (STUs). However, the successful implementation of PPPs in the transportation sector requires addressing several challenges. One of the most significant challenges is the poor infrastructure, which can impact the cost and feasibility of the project. The government must invest in improving infrastructure such as roads, depots, and charging infrastructure for electric buses to make PPP projects attractive to private players.

Another challenge is non-adherence to concession agreement terms and conditions, which can lead to disputes between private players and STUs. This can impact the long-term sustainability of the project and discourage future private investment. The

---

<sup>8</sup> STUs Profile and Performance 2019-20, CIRT and ASRTU

<sup>9</sup> ASRTU, 2022

government needs to ensure that concession agreements are structured appropriately and there is a dispute resolution mechanism in place.

Delayed payment is another challenge that private players face, impacting their ability to secure financing and maintain service quality. The government must ensure that payments are made on time to private players to maintain investor confidence and ensure project sustainability.

Finally, poor administrative support, such as a lack of transparency and accountability, can impact the success of PPP projects. The government needs to ensure that there is a robust governance framework in place and that there is transparency in project execution and decision-making processes. This can help improve investors' confidence and ensure the long-term sustainability of PPP projects in the transportation sector.

### **3.2 Ethical Questions in PPPs**

Implementing PPPs in public transport raises ethical concerns that must be addressed before implementation. Labour welfare, wages, and job security must be considered to retain drivers who are critical to the project's success. The government must ensure that the terms and conditions of the concession agreement include provisions for fair labour practices.

The perception of the government towards private operators must also change to ensure the sustainability of PPPs in public transport. Private operators should not be viewed as opportunistic entities seeking to profit from public assets but rather as partners working towards a common goal of providing efficient and sustainable public transport services.

Moreover, transparency and accountability are crucial in ensuring the ethical implementation of PPPs in public transport. The government must be transparent in the bidding process and ensure that the selection criteria are based on merit and not favouritism. Adequate monitoring and oversight mechanisms must be in place to ensure that private operators adhere to the terms and conditions of the concession agreement.

Overall, addressing ethical concerns is essential for the successful implementation of PPPs in public transport. The government must ensure that labour welfare and fair practices are considered, change its perspective towards private operators, and ensure transparency and accountability in the process.

### **3.3 Challenges in Financing**

Financing public transport services is a critical aspect of developing a sustainable and efficient public transport system. However, several challenges need to be addressed, such as:

1. Lack of government support and funding: Public transport services require significant investment, and governments need to provide adequate support and

funding to ensure their sustainability. However, in many cases, governments may not prioritize public transport or may not allocate sufficient funds for it, leading to financial challenges for STUs.

2. Difficulties in arranging equity capital: Private players often require equity capital to participate in PPP projects. However, arranging equity capital can be challenging due to the perceived risks and uncertainties associated with PPPs, leading to a lack of investor interest.
3. Reliance on vehicle funding instead of project finance: In many cases, STUs rely on vehicle funding instead of project finance to procure buses and other equipment. This can lead to a mismatch between the cash flow of the project and the repayment schedule, resulting in financial difficulties.
4. Delayed payment from government agencies can be a significant challenge for private players involved in PPP projects. This can lead to cash flow problems and impact the financial viability of the project.
5. Changes in route structures: PPP projects in public transport are often based on specific route structures. However, route structure changes can impact the project's financial viability and lead to operational challenges for STUs and private players.

### **3.4 Challenges in Choosing the Right Model**

The choice of the right model for financing and operation is crucial for the success of the project. In India, STUs often face a challenge in choosing the appropriate model among the various options available, such as Gross Cost Contract (GCC), dry lease, and others.

i. Owner-Operator Model:

The Transport Authority owns its own fleet and provides the services departmentally through its own employees. Capital and policy support is provided by the municipal/ provincial/ national government(s).

This model is used where bus services are newly introduced, the scale of operations is low, suitable private operators are not available or where the employee unions are strong and resist private operators' entry. Several cities in India including Mumbai, Kochi and Bengaluru have operated under this model.

ii. Management Contracting Model:

The investment in the transportation assets is primarily made by the Transport Authority and an operator is appointed to provide the services using the assets and within predefined quality and service parameters. For example, in Cape Town, South Africa, MyCity Integrated Rapid Transit procured and provided the 12 m buses to the operators for

a 12-year contract<sup>10</sup>. The common features of this model are:

- Buses to be procured and provided by the Authority.
- Fare Collection responsibility is with Authority
- Payment on per km operated basis with guaranteed kms per year
- For under/excess utilization, the partial fee is paid
- Fees revised in line with an increase in fuel prices/inflation,

However, in order to incentivize the operator to take proper care of the Authority's Assets, several Indian cities have tried different approaches as shown in Table 3

City	Variation	Benefits
Indore (2013-18)	At the end of the contract period, buses to be auctioned and sale proceeds are divided between the Authority and operator in the ratio of 60:40.	<ul style="list-style-type: none"> <li>• Incentivizes the operator to keep the buses in good condition</li> <li>• Reduces per kilometer rate</li> </ul>
Ahmedabad (7+1 years)	Ownership of buses transferred to the operator at book value at the end of the contract.	<ul style="list-style-type: none"> <li>• This reduces the per kilometer rate.</li> <li>• Incentivizes the operator to keep the buses in good condition</li> </ul>
Amritsar (2013-19)	Fuel to be provided by the Authority at fixed mileage of 3 km per liter	<ul style="list-style-type: none"> <li>• The operator is incentivized to upkeep buses in sound condition and cultivate good driving habits in order to maintain required mileage.</li> </ul>
Surat (2008-2015 and renewed)	Joint Investment: Bus chassis procured by Authority, bus body by Operator. Ownership of Buses would be transferred to Operator at the end of contract period	<ul style="list-style-type: none"> <li>• Reduces investment burden on the Authority</li> <li>• Incentivizes the operator to keep the buses in good condition.</li> </ul>

Table 3: Some examples of Management Contracting from India

The management contracting model can be used where the transit authority already owns the buses and wishes to privatise the operations or the private operators do not have the capability or willingness to acquire and finance the buses.

### iii. Franchising /Licencing Model:

The identified route/services are assigned to operators who apply for it on payment of a predefined license fee by the Licensee or a subsidy/grant amount payable by the Authority to the Licensee in case of loss-making but socially desirable services. This model is suitable where the ridership patterns are well established and the transit

<sup>10</sup> MyCity Business Plan 2012 -

[https://www.myciti.org.za/docs/categories/1606/Complete\\_MyCiTi\\_Business\\_Plan\\_2012.pdf](https://www.myciti.org.za/docs/categories/1606/Complete_MyCiTi_Business_Plan_2012.pdf)

authority wants to minimize its involvement in the operations. The Mira Bhayander Municipal corporation operated this model from 2005 to 2017 and since then it has moved to gross cost contracting.

iv. Buy the Service Model:

Private operators are appointed who acquire the buses. Depot land/infrastructure may be provided by the transit authority on an “as is” basis or the operator may need to arrange it (e.g. London/Jakarta). There are two main variations in this model based on the mode of remuneration to the operator, namely:

- a) *Gross Cost Contracting* (GCC) – The Authority frames rules, policies, routes, fare structure and other service parameters and procures the transportation services from private operators. Authority collects the fares and bears ridership risk and the operator is paid on the basis of fleet size and/or kilometres run.
- b) *Net Cost Contracting* (NCC) – Similar to GCC except Operator collects and appropriates the fare and consequently bears the ridership risk and often the risk of delay in fare revisions. Depending on the profitability of the operations, either the operator pays a premium or receives a fixed subsidy based on kilometres run from the Authority.

A comparison of the GCC and NCC models of operations is presented in Table 4.

	Gross Cost Contracting	Net Cost Contracting
Pros	<ul style="list-style-type: none"> <li>● Flexible operation</li> <li>● Easy to introduce</li> <li>● Reduces on-street competition and unscheduled stops</li> <li>● Ensures service levels during lean hours</li> <li>● Lower risk to operators results in efficient pricing</li> <li>● Quality of service is part of performance parameters</li> </ul>	<ul style="list-style-type: none"> <li>● Transfers revenue risk to the operator</li> <li>● Allows public agencies with limited staff and technical capacity to manage the operations</li> <li>● Reduces the risk of fare evasion leading to subsidies</li> </ul>
Cons	<ul style="list-style-type: none"> <li>● Authority bears all the revenue risk.</li> <li>● Needs a strong Authority and very good supervision</li> <li>● increases the risk of operators skipping passengers, fare evasion and need for subsidies</li> <li>● increases the risk of driving more kilometers than needed</li> <li>● Applicability of goods and services tax on fee payments</li> </ul>	<ul style="list-style-type: none"> <li>● Lack of flexibility. Difficult to add more services</li> <li>● Overlapping routes compete for passengers</li> <li>● Maximizing profits is the priority rather than service quality</li> <li>● Operators wait to fill up the bus and pick up passengers at unregulated stops</li> </ul>
Suitability	<ul style="list-style-type: none"> <li>● Markets where accurate revenue forecasting is difficult and</li> </ul>	<ul style="list-style-type: none"> <li>● For established markets where the ridership level have</li> </ul>



	credible track record is not available such as the introduction of new services/routes	stabilized and fare revisions are predictable
--	--	---

*Table 4: Pros and Cons of GCC and NCC<sup>11</sup>*

Many net cost contracts in India failed to achieve desired outcomes or even run the course of the contract. The NCCs in Kota, Jalgaon, Jodhpur, Rajkot, Delhi (DMRC Feeder), Vadodara, and Ludhiana for instance, were closed or prematurely terminated, whereas the transit authorities in Ujjain, Indore and Bhopal found it difficult to expand the system. Often cities move to GCC after failing to receive adequate interest for NCC tenders (Ludhiana, Amritsar etc.). On the other hand, GCC contracts once awarded are found to be easy to operate. Many cities including London, Delhi, Indore, Bogota, and Ahmedabad have successfully operated on a GCC basis for a number of years<sup>12</sup>.

Given the relative merits and demerits of GCC and NCC, a mixed approach creates an environment for equitable sharing of risks and incentives between the authority and operator and thus gives optimal results i.e. profitability balanced with service. Some city bus systems have utilised a mixed approach in order to minimize these negative outcomes inherent in gross and net cost contracts. For example, in Transmilenio, Bogota, the operator is paid based on both kilometers run and fare revenue collected. Some features of the model are as follows:

- A fixed percentage of the total revenue is shared amongst the 7 trunks, 6 feeder and 2 fare collection concessions incentivising the operators to provide maximum service.
- There is no fixed rate per kilometre and total revenue is distributed amongst the operators based on kilometres run (see Figure 43).
- Operators must maintain a specified load factor and hence the operator minimises empty/low ridership kilometres.
- Penalties and bonuses applicable based on service quality,. e.g. Penalty is applicable, inter alia if dispatch compliance is less than 95% or regularity index is less than 70%.

Similarly, incentives are paid when the Operator Total Performance Index (weighted average of Regularity (20%), Punctuality (15%) and User Satisfaction (65%) indices) is above 80%. The money available from the penalties is distributed among the operators that are eligible for a bonus in proportion to their final quality score.

<sup>11</sup> *Bus Karo - Guidebook on Planning and Operations, EMBARQ, 2010*

<sup>12</sup> Prof. H. M. Shivanand Swamy and Gautam Patel, PPP Arrangements in Urban Transport, 2<sup>nd</sup> Asia BRT Conference, Ahmedabad, September 2014

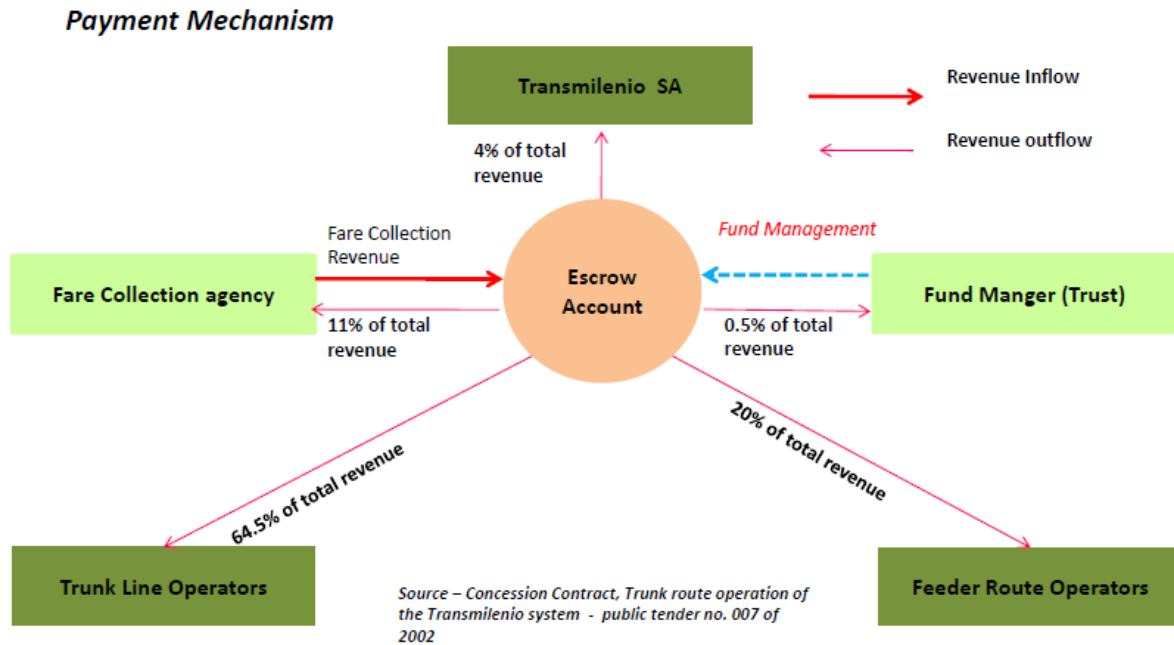


Figure 1 : Distribution of Fare Revenue for the TransMilenio Bus Service System<sup>13</sup>

While improving upon several deficiencies of the GCC and NCC, the mixed approach also suffers from two main deficiencies:

- The payment system is complex and not straightforward for the operators
- Operators do not have the incentive to increase the number of buses resulting in overcrowding in peak hours.

It is important for the government to evaluate its existing public transport system and decide on the best model for their requirements. This decision must be based on factors such as the availability of funds, expertise, resources, and the nature of the public transport demand in the region. The choice of the model will also determine the roles and responsibilities of the private and public sector partners, the distribution of risk and reward, and the regulatory framework.

Choosing the right model can be a critical factor in ensuring the financial sustainability of the project and the quality of service provided to the public. The government must carefully evaluate the strengths and weaknesses of each model and choose the one that is most suitable for their specific needs.

<sup>13</sup> PPP ARRANGEMENTS IN URBAN TRANS, Prof, Shivanand Swamy and Gautam Patel, 2nd Asia BRT Conference, Ahmedabad, 2014

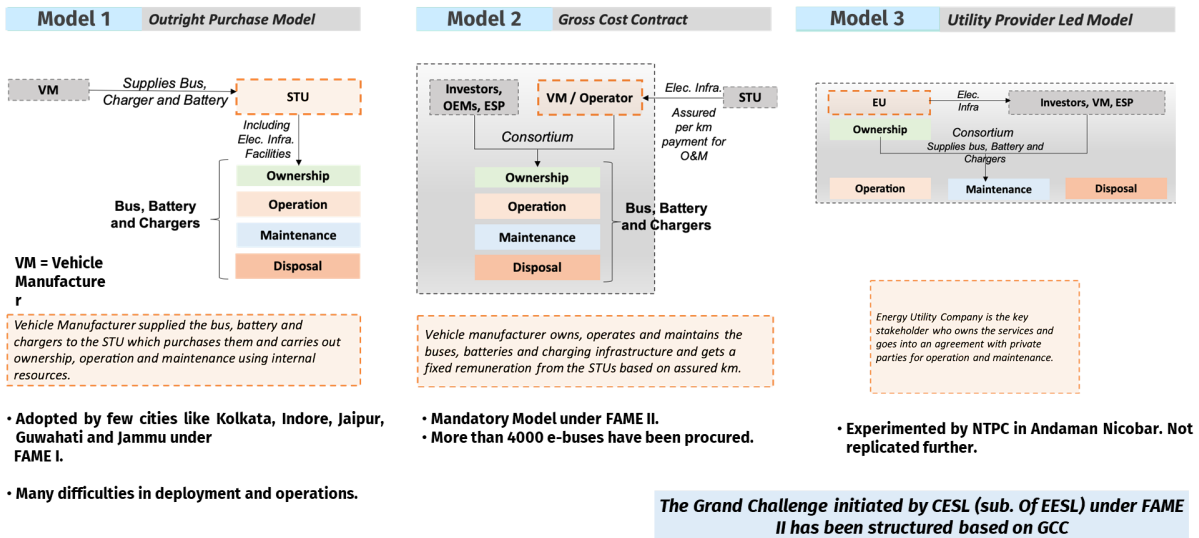


Figure 2 : Various business models for electric buses in India<sup>14</sup>

### 3.5 Factors Affecting Cost per Kilometer

The cost per kilometre for bus services in different cities can vary depending on several factors, as mentioned earlier. The investment required for purchasing buses, setting up infrastructure, and maintenance can significantly impact the cost. The roles and responsibilities of each partner, such as the government and private operators, can also affect the cost, as the allocation of financial and operational risks can vary.

Other factors, such as the minimum wage, fuel rates, and maintenance costs also contribute to the overall cost. The contract period and the number of buses being operated are also essential considerations, as these can affect the economies of scale.

The level of traffic and the condition of the roads can also impact the cost, as they can affect fuel consumption and maintenance requirements. It is crucial to factor in the escalation formula, penalty schedule, residual value, payment history, and dispute resolution mechanism to ensure that the cost per kilometre is accurately determined and that the project remains financially viable.

### 3.6 Challenges in Implementing IT-Based Buses

Integrating Information Technology (IT) systems into public transportation is an important aspect of improving the efficiency and quality of service. However, in India, none of the Original Equipment Manufacturers (OEMs) currently produce IT-based buses, which presents a challenge for implementing IT-based systems. The government must provide the necessary infrastructure, including IT equipment and software before such systems can be put into use.

<sup>14</sup> Public Private Partnerships in Public Transport Buses - Prof. H M Shivanand Swamy Professor Emeritus, Centre Of Excellence in Urban Transport, CRDF – CEPT University, Ahmedabad

Another significant challenge is the integration of IT systems for bus operators. This is because of issues with vendors and a lack of understanding of how to integrate different systems. The implementation of Automated Ticket Collection (AFC) systems is also a major challenge.

Public-Private Partnerships (PPPs) with appropriate tender conditions can help overcome these challenges by involving private players with experience and expertise in IT systems. The government can ensure that tender conditions include mandatory IT-based systems, including AFC systems, to improve the efficiency and transparency of public transportation.

### **3.7 Challenges of Adopting Electric Buses for private operators**

The transition to electric buses requires significant investments in charging infrastructure, which can be a challenge for private operators and financiers. Lack of charging infrastructure investment can be a significant challenge, and solutions to this issue must be found to make electric bus projects more bankable. A possible solution is to have charging infrastructure and leasing models provided by OEMs, DISCOMs, or finance companies. This could increase private operator interest and make electric buses more financially feasible.

Moreover, private banks are generally hesitant to fund electric buses due to their higher upfront costs and perceived risk associated with them. As a result, leasing models are a more feasible option for financing electric buses. By leasing electric buses, private operators can avoid the high upfront costs and receive support with charging infrastructure and maintenance. This can help attract more private operators to participate in PPP projects for electric buses.

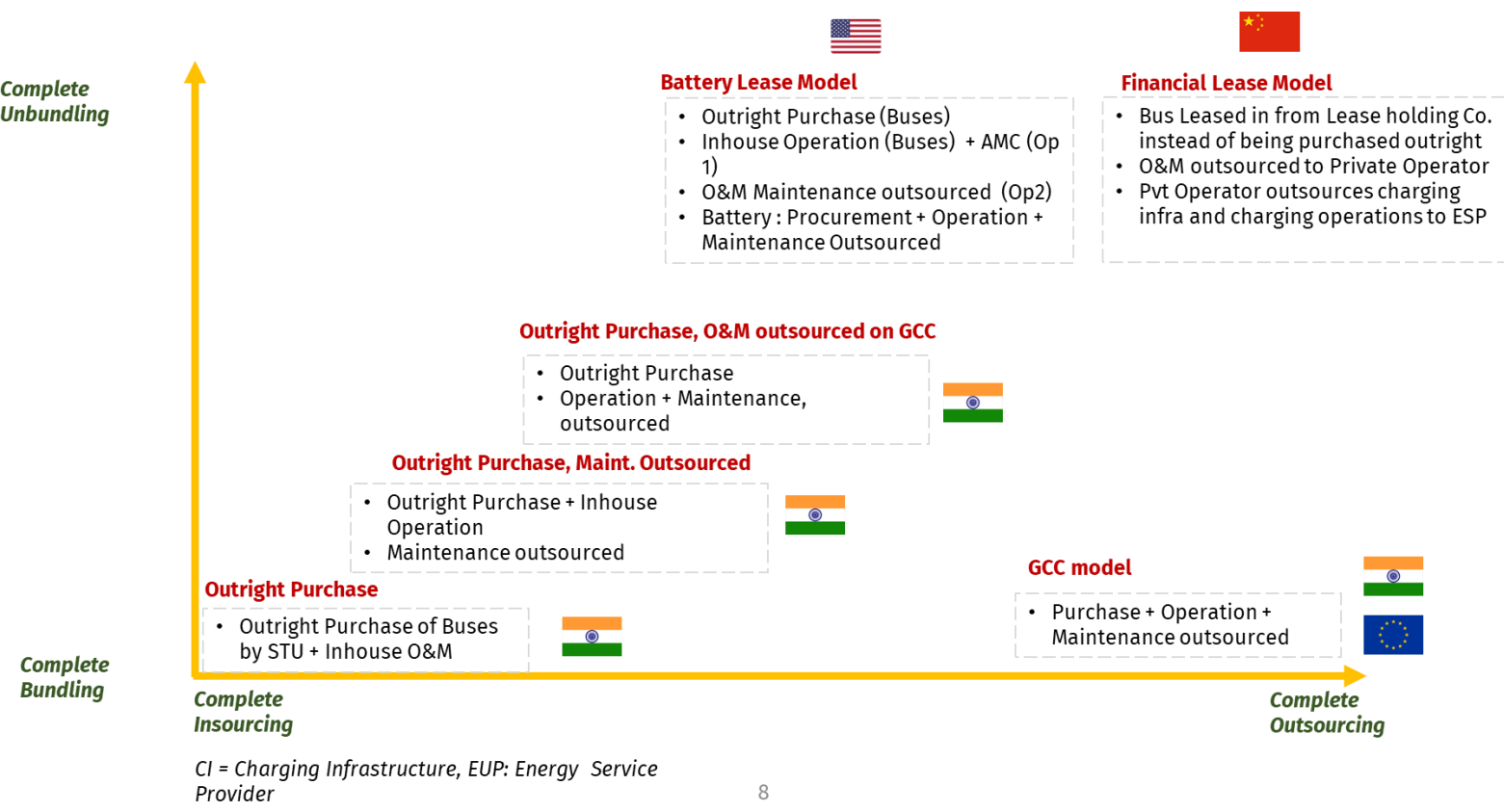


Figure 3 : Various business models across the world for operation of electric buses to overcome the conventional constraints<sup>15</sup>

<sup>15</sup> Public Private Partnerships in Public Transport Buses - Prof. H M Shivanand Swamy Professor Emeritus, Centre Of Excellence in Urban Transport, CRDF – CEPT University, Ahmedabad





Figure 4 : Prof. H M Shivanand Swamy, Professor Emeritus, Centre Of Excellence in Urban Transport, CRDF – CEPT University, Ahmedabad presenting various strategies to make PPP successful

### 3.8 Responsibility and Ownership

State Transport Undertakings (STUs) have potential strength and capacity in strategic planning, permission, physical and IT infrastructure, performance, and quality management in public transport. While private operations offer benefits such as cost control and budgetary provision, while investment, manpower recruitment, and training can be joint activities in PPPs.

Public-Private Partnerships (PPPs) can provide a fixed cost and a clear visibility of costs to the State Transport Undertakings (STUs) and state governments. This makes it easier for them to make budgetary provisions for the bus system as they can estimate the costs more accurately.

In traditional procurement, the STUs have to bear the full cost of bus procurement, operation, and maintenance, which can be a significant financial burden. However, under PPPs, the private sector is responsible for part of these costs, and the risk is shared between the public and private sectors. This sharing of costs and risks can make budgetary planning easier for STUs and state governments.

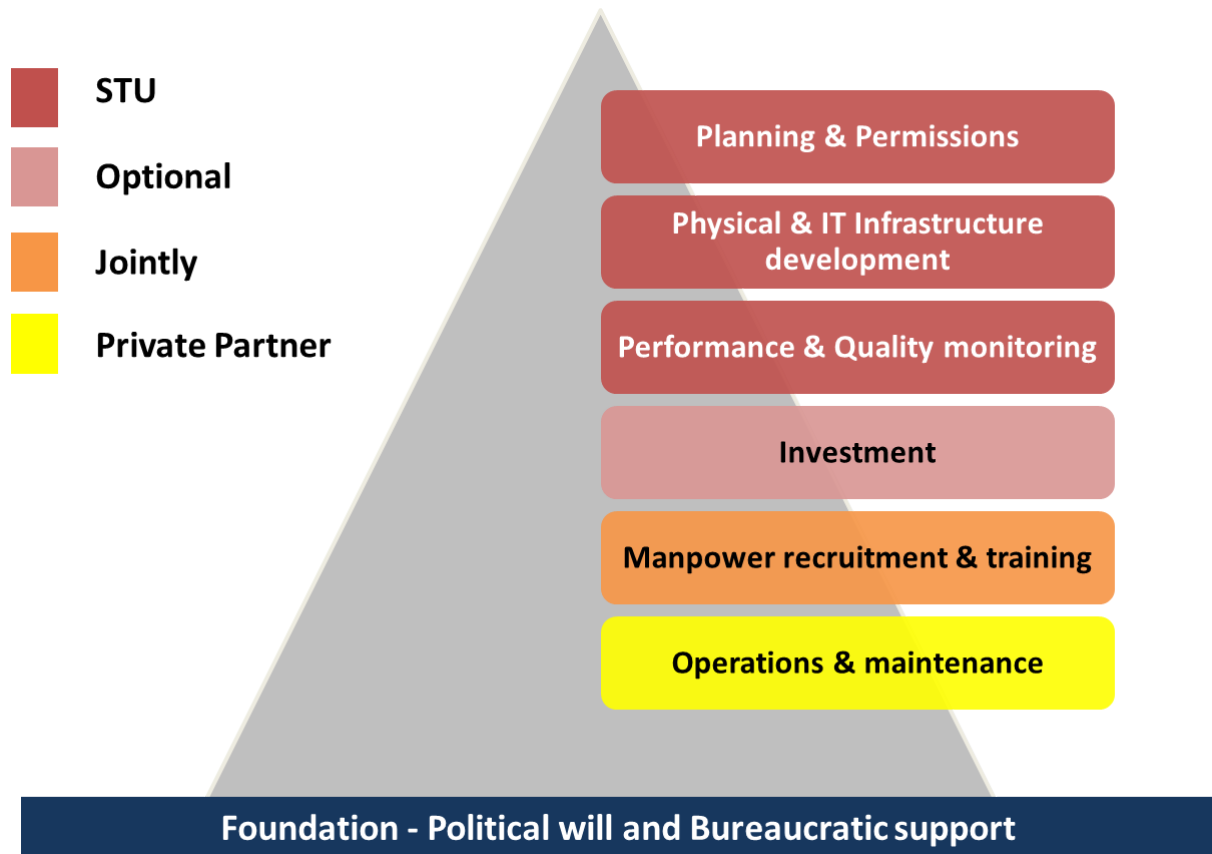


Figure 5 : Roles and responsibilities of various stakeholders in PPP<sup>16</sup>

This approach allows the private sector to bring in its expertise and resources to help improve the efficiency and quality of public transportation services. By taking on these operational responsibilities, the private sector can help to drive down costs and improve service levels. In contrast, the public sector can focus on ensuring that services remain accessible and affordable to all.

One critical aspect of successful PPP operations in public transportation is ensuring that fare collection and monitoring, and control remain in the hands of STUs. This allows the public sector to retain control over critical aspects of the transportation system while leveraging the expertise and resources of the private sector to improve operations.

Moreover, PPP contracts usually have clear performance indicators, which make it easier to monitor and evaluate the performance of the bus system. This can help the STUs and state governments make informed decisions on future investments and budgetary allocations.

To utilise the potential strengths of STUs and private operators, unbundling of various components should be explored with defined roles and responsibilities.

<sup>16</sup> Source: BOCI



Various system Components are clubbed together to avoid 1) multiple vendor management 2) delayed availability of interdependent components

Figure 6 : Unbundling of various components in PPP<sup>17</sup>



Figure 7 : Mr Prasanna Patwardhan, President Bus & Car Operators Confederation of India (BOCI) explaining the importance of restructuring of STUs and roles and responsibilities of STUs and private operators

**Recommended Organizational Structure for E-Bus Operation on PPP Model<sup>18</sup>**

The STU departments in need of strengthening through the adoption of e-Buses under PPP are identified here. As e-Buses are deployed, these departments will need to enhance

<sup>17</sup> Public Private Partnerships in Public Transport Buses - Prof. H M Shivanand Swamy Professor Emeritus, Centre Of Excellence in Urban Transport, CRDF – CEPT University, Ahmedabad

<sup>18</sup> TRAINING NEEDS ASSESSMENT FOR ELECTRIC BUSES IN INDIA VOLUME III - PROPOSED ORGANISATIONAL STRUCTURE FOR EBUSES by GIZ (Deutsche Gesellschaft für )

the skills of their staff, with a particular focus on managers and assistant managers, in order to effectively carry out the following functions related to e-Buses.

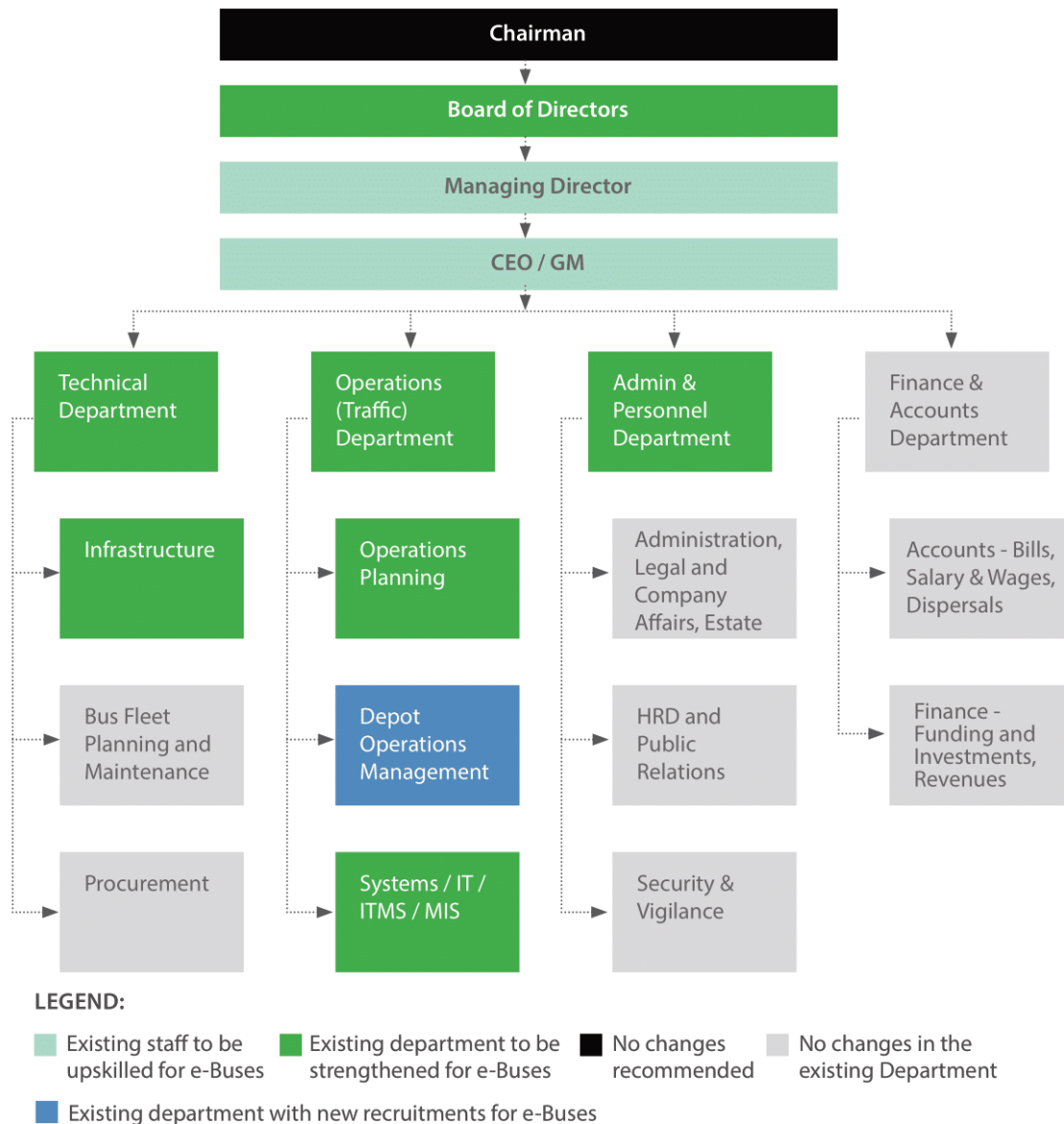


Figure 8 : Proposed Organizational Structure for E-Bus PPP Operation<sup>19</sup>

- **Infrastructure department:** Plan, acquire and maintain the required infrastructure developed by the contracting authority
- **Bus fleet planning and maintenance department:** planning and setting standards related to e-Bus sub systems, develop specifications, oversee maintenance, and carry out periodic checks

<sup>19</sup> TRAINING NEEDS ASSESSMENT FOR ELECTRIC BUSES IN INDIA VOLUME III - PROPOSED ORGANISATIONAL STRUCTURE FOR EBUSES by GIZ (Deutsche Gesellschaft für )

- **Procurement department:** Prepare terms and conditions to engage private operators once e-Bus and related specifications are available
- **Operations Planning department:** Route network planning based on the charging system, battery capacity, available range etc.
- **Systems / IT / ITMS / MIS department:** Identify diagnostic areas of e-Bus and incorporate in the ITMS hardware and software.

### 3.9 Selection of Operators

Selecting an operator solely based on the lowest quote may not always be the best option. Experts have suggested that other factors, such as the operator's experience and past performance, should also be considered during the selection process. Encouraging new players to enter the market is important, but not at the cost of compromising the quality of service.

Choosing an operator with prior experience in bus supply/operation and financial strength, as well as a local presence in terms of service centres and maintenance support, can lead to a more successful partnership. Additionally, linked contracts such as ITS, fare collection, security, station maintenance, and housekeeping should also be considered during the selection process. Therefore, it's important for stakeholders to balance the need for new players and competitive prices with the importance of selecting an experienced and reliable operator. This can help ensure the quality and sustainability of the partnership over the long term.



## 4. Learnings from PPP experience in India

This chapter aims to present a comprehensive overview of the various Public-Private Partnership (PPP) practices in State Transport Undertakings (STUs) across India. Additionally, it will examine the key challenges faced in implementing PPPs in STUs, the mistakes made in the past, and the outcomes achieved through these partnerships. Finally, the chapter will present key takeaways and recommendations for the way forward to ensure the success of PPPs in STUs in India.

### 4.1 Case Study 01: APSRTC's Bus Hiring Scheme

The Andhra Pradesh State Road Transport Corporation's (APSRTC) bus hiring scheme started in 1979 with rural buses and expanded to include higher-end buses like Super Luxury, Super Deluxe, Semi-Luxury, and Express Super Express. The percentage of buses taken on hire increased from 4% to 20% in 2010. The percentage decreased to 16% in 2015 and has since increased to 26%, with plans to add 1176 e-buses on a GCC model.

Year	Achievement
1979	Introduced bus hired scheme in rural areas for Mofussil buses
1985	Hired bus scheme Extended to non AC Deluxe, Luxury and Express type buses
2015	Hired bus scheme Extended to AC Super Luxury and Indra AC buses
2022	Hired bus scheme extended to AC and Non AC Sleeper buses

Table 5 : Historic Timeline of APSRTC's bus hiring scheme

Year	Total	STU	Hire	% of hired buses
1985	9,004	8,688	316	4
1990	12,078	11,806	272	2
2000	17,496	16,833	663	4
2005	18,353	16,660	1,693	9
2010	20,417	16,315	4,102	20
2015	12,229	10,212	2,017	16
2020	10,946	8,422	2,524	23
2022-23	10,322	7,666	2,656	26
2023-24	Planning to add 1,176 more hired buses, taking it to 37%			

Table 6 : APSRTC's historic trend of operating hired buses

Initially, the cost per kilometre was worked out based on various factors such as the cost of the vehicle, bank interest rate, and maintenance cost etc, and the lowest quoted price was selected. Later, a minimum of 5% above the indicative price was enforced to prevent operators from quoting too low and incurring losses. The hiring process is now conducted on a digital platform, with a reverse bidding<sup>20</sup> process and negotiation with the L1<sup>21</sup> bidder. The aim is to get a good price for the organization while ensuring the operator is not at a loss.



Figure 9 : Mr Dwaraka Tirumala Rao, IPS, Managing Director, APSRTC presenting the case of APSRTC

S No	Year	Type	Criteria
1	1979-2007	Manual	Lowest quoted price system (lowest quoted price shall be $\leq$ to indicative price)
2	2007-2013	Manual	To quote between minimum and maximum of notified indicative price (maximum of 5%)
3	2013-2017	Manual	Fixed rate quote system followed by lottery in case more than one applicant.

<sup>20</sup>**Reverse Bidding:** Reverse bidding is a procurement method where the buyer requests goods or services, and potential sellers bid to offer the most competitive price. The seller with the lowest bid wins the contract. One example of this is government contracting, where the government outlines the project's requirements, and pre-approved contractors compete to provide the most cost-effective solution.





<sup>21</sup>**L1 Bidder:** The L1 bidder in the Gross Cost Contract context is the bidder who has submitted the lowest overall cost proposal. This means that their proposed cost for operating the bus services, along with the profit margin, is the most competitive among the bidders. The selection of the L1 bidder is typically based on the evaluation criteria set by the contracting authority, which considers both cost and non-cost factors.

4	2017-2023	Digital	Applicant rate quote system followed by reverse auction mechanism on MSTC e-tender portal.
---	-----------	---------	--

Table 7: APSRTC's Evolution of PPP Models

## Current Status of Fleet

The APSRTC's hired bus fleet consists of 2,656 buses, of which 100 are electric. The electric buses are currently only being used in Tirupati, at ₹53/km (including power) for Tirumala - Tirupati Ghat route and at ₹45/km (including power) for intercity routes operated from Tirupati. Apart from electric buses, the majority of the buses in the hired fleet are Pallevelugu and Ultra Pallevelugu (Mofussil) diesel buses, used for rural, with only 122 buses used for city services. The current cost per kilometer (CPK) is ₹42.07 rupees, with ₹27.34 being paid to the operator and ₹12.12 being used for personnel costs and ₹ 2.61 for MV Tax. APSRTC prioritizes timely payments to their operators as they are crucial partners in the bus services, and any loss of services could be detrimental.

S No	Type	Photo	Buses	Fuel Type	Bus Length (m)	Agreement period
1	<b>A/C - Operated on Tirumala - Tirupathi Ghat route</b>		100	Electric	9	12 years
2	<b>A/C - Intercity AC luxury coach service</b>		21	Diesel	12	4+2 years
3	<b>Non A/C Sleeper - Intercity non AC Sleeper coach service</b>		16	Diesel	12	4+2 years
4	<b>Non A/C Special type - Ultra Deluxe coach</b>		799	Diesel	11	4+2 years



5	<b>PVG &amp; UPVG (Pallevelugu &amp; Ultra Pallevelugu):</b> Mofussil Service		1,598	Diesel	11	4+2+2 years
6	<b>City - Urban Service</b>		122	Diesel	11	4+2+2 years
<b>Total</b>			<b>2,656</b>			

Table 8 : Total hired buses by APSRTC

### Challenges faced by APSRTC

1. Sometimes the operator fails to supply buses in time
2. The operator withdraws buses before the agreement ends, which happens around 10% of the time.
3. The corporation has very little flexibility in deploying buses in response to demand, which can cause dissatisfaction among passengers during peak hours.
4. Poor behaviour of private bus drivers and attendants, with high absenteeism and attrition rates.
5. The operators show reluctance to adopt new technology, such as SIM-based EPOS machines, which can minimize revenue leakage.
6. Private bus drivers exhibit poor behaviour such as not adhering to schedules, early or late departures, overspeeding, rash driving, skipping stops, and rude behaviour with passengers. There is also a concern about revenue leakage.
7. Bus operators are requesting driver insurance and restrooms.

### Key takeaways

The APSRTC emphasizes maintaining a 40% threshold in hired bus fleets to avoid potential problems such as sudden strikes by drivers. The organization has plans to add e-buses to its fleet and prioritize timely payments to its operators. However, challenges such as a lack of regular bus supply, poor driver behaviour, and high levels of absenteeism and attrition among private drivers need to be addressed. The organisation suggested that investing in operations monitoring solutions and offering more attractive interest rates through the support of the government of India could help improve the situation.

## 4.2 Case Study 02: TSRTC's Pricing Model and Adoption of Electric Buses

TSRTC (Telangana State Road Transport Corporation) is the state-owned public transport corporation in Telangana, India. It is responsible for providing bus services and connecting various cities, towns, and villages within the state. TSRTC plays a crucial role in facilitating transportation for both urban and rural areas, ensuring reliable and affordable travel options for the residents of Telangana.

TSRTC adopted its existing model that was in place before the state's bifurcation from APSRTC (Andhra Pradesh State Road Transport Corporation). The corporation determines the base prices for various components by conducting a thorough analysis of market rates and establishing the standard HSP<sup>22</sup> consumption for the buses in the tender process.



Figure 10 : TSRTC's hired Express buses (intercity) and Pallevelugu buses (Mofussil)<sup>23</sup>

To establish the base prices, TSRTC considers the prevailing market rates and determines the standard HSP consumption for the buses involved in the tender. Subsequently, low and high base prices are published for each kilometer, and bidders are required to quote either one of these fixed prices. It is observed that there is typically a large number of bidders participating for Mofussil/Express buses at the lower base price, while the number of bidders for city/interurban buses is comparatively smaller. Following is the detailed explanation to this.

### Challenges faced by TSRTC

1. Operational Challenges: Operating buses in urban areas poses various challenges, such as lower operational speeds, frequent stoppages, and difficult driving conditions. These factors result in poor fuel efficiency, increased wear and tear, and higher maintenance costs for city/interurban buses.

<sup>22</sup> HSP consumption refers to the amount of power or energy required by a vehicle, specifically a bus in this case, to operate efficiently. It is a measure of the rate at which the bus engine consumes fuel and produces the necessary power to drive the vehicle. The HSP consumption is influenced by various factors such as the weight of the bus, its design, engine efficiency, driving conditions, and speed. By studying and establishing the standard HSP consumption for buses, organizations like TSRTC can determine the base prices and make informed decisions regarding fuel efficiency, operational costs, and overall performance of their fleet.

<sup>23</sup> Photo Courtesy: <https://www.facebook.com/APSRTC.Buses>



2. **Traffic Conditions:** Urban operations are often plagued by congested traffic conditions, leading to delays and penalties for operators who fail to complete trips within the expected timeframe. These penalties further increase the overall costs of operating city/interurban buses.
3. **Assured Kilometers:** Mofussil/Express bus services generally have a higher assurance of covering a specific number of kilometers as compared to city/interurban services. The uncertainty in the number of kilometers covered by city/interurban buses adds to the financial risk for bus operators, making Mofussil services more attractive in terms of cost effectiveness.
4. **Fuel Efficiency:** The combination of frequent stoppages, slower speeds, and challenging driving conditions in urban areas results in poor fuel efficiency for city/interurban buses. Higher fuel consumption further contributes to the operational costs, making Mofussil/Intercity services comparatively more cost-effective.

The observed pattern of a higher number of bidders for Mofussil/Express buses at lower base prices, compared to city/interurban buses, can be attributed to the significant cost advantages of operating in non-urban areas. The challenges associated with urban conditions, including lower operational speeds, frequent stoppages, high wear and tear, difficult driving conditions, and the variability in assured kilometers, contribute to the increased operational costs and decreased cost effectiveness for city/interurban services. Recognizing these factors is crucial for TSRTC and other bus operators to optimize their services and financial viability by considering the operational dynamics and cost implications associated with different types of bus services.



*Figure 11 : Dr. V.Ravinder, IPS, IGP Retd. Chief Operating Officer, TSRTC explaining the PPP experience of TSRTC*

In the specific case of airport electric buses, TSRTC has implemented the Gross Cost Contract (GCC) model. Under this model, Olectra, the successful bidder, is currently operating 40 electric buses at ₹ 42/km (including power cost). The GCC model allows private operators to provide the buses and associated services, while TSRTC retains control over fare collection and other essential aspects.



Figure 12 : TSRTC's 12m electric bus operated on Airport route in Hyderabad (Mofussil)<sup>24</sup>

The adoption of the GCC model has proven beneficial in introducing electric buses into the TSRTC fleet. By incorporating sustainable transportation options like electric buses, TSRTC aims to reduce environmental impact and promote greener mobility solutions. This case study exemplifies TSRTC's proactive approach towards embracing new technologies and fostering sustainable practices within the transport sector.

### 3.3 Case Study 03: DIMTS Revolutionizing Public Transport

Delhi Integrated Multi-Modal Transit System (DIMTS) is a public-private joint venture between the Government of Delhi and the IDFC Foundation. As the Program Management Consultant (PMC), DIMTS manages all private stage carriage buses (known as cluster buses), DTC electric buses, and DMRC's feeder buses under an integrated mechanism in Delhi. DIMTS has almost a decade of experience in managing buses under the Public-Private Partnership (PPP) model in Delhi, and it is also managing buses under the Gross Cost Contract Model in Nagpur and Gurugram.

In 2011, the government introduced buses in the organized sector under the cluster scheme, with a public sector operator (DTC) and a private entity operating buses under the cluster scheme. The buses operate on each route under a unified timetable, with a 50-50 operating ratio between the public and private sectors. The current plan is to double the share of public transport and only use electric buses, with a target fleet of 11,000 buses. As of now, the fleet in Delhi, including DTC, cluster buses and metro feeder, is 7,200 buses, and the aim is to move towards Level of Service (Los) II specified by service Level

<sup>24</sup> Photo Courtesy: <https://www.facebook.com/APSRTC.Buses>

Benchmarking for Urban Transport by MoHUA with a target of 12,000 buses within the next three years.<sup>25</sup>



Figure 13 : DTC electric bus<sup>26</sup> and Delhi Transit Cluster bus operated by DIMTS<sup>27</sup>

### **DIMTS's Opex Model**

Managing 3,700 buses, out of which 400 are electric buses operated at ₹67/km (including power and driver) under the GCC contract. While cost of operating CNG buses varies from ₹60/km to ₹70/km (including fuel and driver). A total of 911 CNG buses were procured in 3 different phases from 2013 to 2018 and operated at 3 clusters with variation in daily assured kilometer. The GCC model requires a process approach and data-driven decisions based on data analytics. The mandatory fitment of AIS 140-compliant GPS devices in buses allows for online data with a 10-second polling rate, which can be used to make data-driven decisions. ITMS in the buses also provide passenger profiling data. On-time performance and user satisfaction are important performance indicators that DIMTS follows. Robust monitoring systems through ITMS help in the effective management of services. DIMTS's efficient opex model determines that Capacity building is required for state transport undertakings to operate under the GCC model, which includes operations planning, timetable optimization, operations control centre, monitoring system, fare collection management, deployment of conductors, a system for validation of payment, optimization of revenue, and viability gap reduction.

<sup>25</sup> Extent of Supply / Availability of Public Transport: Ratio of Total Public buses available in the city with total population. Which determines the Level of Service of availability of Public Transport.

Lower the LoS, higher the quality of service

LoS 1:  $\geq 0.6$  | LoS 2: 0.4 to 0.6 | LoS 3: 0.2 to 0.4 | LoS 4:  $< 0.2$

<sup>26</sup> Photo Courtesy: <https://www.news18.com/>

<sup>27</sup> Photo Courtesy: <https://auto.economictimes.indiatimes.com/>





Figure 14 : Mr C.K Goel, Senior Vice President (Road Transport), Delhi Integrated Multi-Modal Transit System Limited (DIMTS) presenting the PPP case of DIMTS

## **DIMTS's robust payment mechanism**

**Agility Account and Designated Account:** The government keeps the funding in an agility account, with payments being reserved in a designated account that is replenished every three months. The designated account is maintained by DIMTS on behalf of the government. The money flows from the annual budget to the designated account, ensuring that there is no fund deficit. Therefore, there is always enough cash flow to support operations. The revenue collected from ticket sales also goes into the designated account. Every quarter, the government checks to see if they need to add more money to the designated account based on how much money DIMTS has utilised. This is called the "viability gap assessment funding". The predetermined per-kilometre cost for the entire contract period makes it simpler for the government to allocate viability gap funding. This is achieved by leveraging the cost deficit data provided by DIMTS.

**Legitimate Payments:** To ensure the smooth operation of the project, payments are released based on concession activity and in accordance with the contract and government audit procedures. This means that payments to the operator are made promptly, and there are no unnecessary delays in the payment process. By adhering to this mechanism, the funding is utilized efficiently, and the operations can run without any disruption. This also helps to maintain accountability, transparency, and fairness in the payment process. Operators under DIMTS have quoted that this type of robust payment mechanism has helped improve the bankability of projects.

DIMTS payment mechanism system is certified as the best payment mechanism in the country by the operators. No hassle payment is assured by online payment mechanism of DIMTS.

## Electrification of Fleet

DIMTS has successfully electrified 10% of its fleet with 300 e-buses. DIMTS plans to fully electrify the fleet within the next three years, resulting in a projected operating cost savings of 28%. Currently, 1500 e-buses under the CESL Grand Challenge program are under procurement. 3440 additional e-buses will be procured under National Electric Bus Program in upcoming years. Delhi has consolidated demand and made the requirement for additional electric buses available in various tenders for different packages, including wet leases and dry leases.

All depots and infrastructure to support the electric buses have been planned in advance to ensure the efficient operation of the fleet. Delhi has opted for a concession period of 12 years, and there is the provision of subsidy. The payment security mechanism is very robust, and the cost of electricity and consumables is indexed for long-term sustainability. DIMTS introduced the indexation of the manpower cost with the minimum wages of the city to make the contract long-term sustainable. The OEMs have been provided with a facility for 16-hour cycles and a half-hour break for shift and changeover, which can be extended up to 60 minutes for charging purposes. The operational flexibility of the buses has been maintained, with an operating range requirement of 200 kilometres.

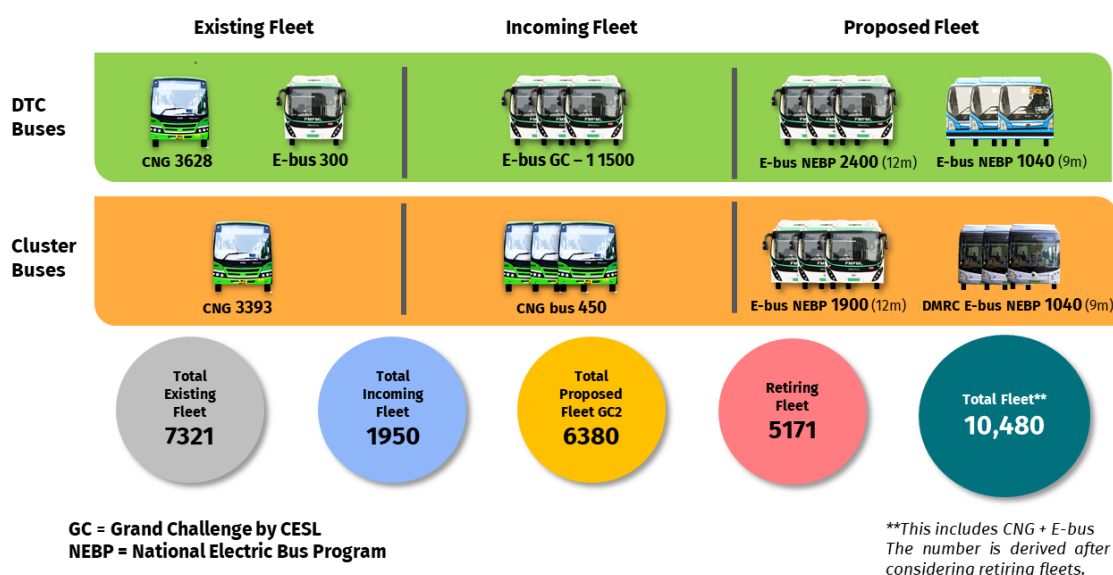


Figure 15 : DIMTS's Fleet augmentation plan

## Challenges faced by DIMTS

The key challenge identified is the need for a robust monitoring system to track operator performance, operations planning and scheduling to optimize vehicle utilization and ridership, fare collection management to minimize revenue leakage, compliance with GST laws, and addressing public complaints and safety concerns.

To address these challenges, DIMTS is introducing NCMC-compliant electronic ticketing machines, processing payments based on service type rather than duty or bus, and prioritizing compliance with GST laws.

## **Challenges faced by DIMTS Operators**

The operator of cluster buses also certifies that the payment mechanism is very robust. The payments are made very promptly. There are penalty clauses in the contracts but due to transparency maintained in payments and penalties levied, the system is working well as compared to other states in India. In many other STUs, the payments are not made transparently by following complete online processes. The penalties levied are subjective and are delayed which lack transparency.

A few issues that the operators face are:

1. Taxes Interpretation: GST interpretation is still ambiguous and is resulting in the retrospective imposition of GST which becomes a huge burden on the operator
2. Online platform decides the imposition of penalties: sometimes the technology is not supported by real-life situations which cause undue penalty cuts. For example, designated bus stops are not found on the route, they do not have any landmarks, shelters etc. However, the drivers are fined for skipping the bus stops in many cases without proper justification.

## **Key takeaways**

The following are the key consideration for sustainable PPP operations by DIMTS:

- The government funding mechanism for public transport in Delhi ensures the efficient management of funds and the smooth operation of public transport in the city.
- The use of the agility account and designated account mechanism ensures that there is no fund deficit and that legitimate payments are made in a timely manner.
- Bundling/ aggregation of demand both for augmentation and in lieu of retiring fleet in next three years to get economy of scale
- Facilities provided by Authorities- Depot infra with upstream power infra with sanctioned power load provided by Authority in the depot
- Concession Period-12 years
- Assured kilometrage (urban bus) @ 70,000 per bus per annum
- Annual Revision of Fees based on index value for manpower cost and other consumables. Electricity at the actual tariff of the state with a cap based on efficiency criteria
- Introducing NCMC-compliant electronic ticketing machines.
- Need for taxes to be more transparent
- Validate penalties on the ground along with technological intervention

The following are the key consideration for sustainable E-bus operations by DIMTS:

- The commitment of the amount of upfront capital subsidy (demand incentive) at parity with the DHI's FAME-2 Scheme by the state Govt.

- Assessment of requirement of EVs ( e-buses) in the next 3 years with e-bus type/ size.
- Earmarking depot(s)/ depot (s) space for e-bus depots with capacity.
- Feasibility Assessment of power load with cost and timelines with Discoms.
- Selection of routes.
- Mapping of routes with depot based on least dead mileage.
- Decision on the operating model ( Capex, Opex-wet lease/ dry lease).
- Provision of capital funds for the construction of the depot with power load infra & capital subsidy.

### **3.4 Case Study 04: UPSRTC Innovative Schemes**

The Uttar Pradesh State Road Transport Corporation (UPSRTC) is a state-owned corporation that provides transportation services in Uttar Pradesh. The UPSRTC has offered various schemes for attracting Public-Private Partnership (PPP) partners in the transportation sector. These include the rural bus contract scheme, sleeper bus contracts, mid-segment AC bus contracts, and air-conditioned sleeper bus contracts.

#### **Rural Bus Contract Scheme**

The rural bus contract scheme aims to connect rural areas to urban and semi-urban by offering concessions to operators who operate at least 20-25% of their buses in rural areas. Through this scheme, UPSRTC has connected over 10,000 villages in Uttar Pradesh and plans to connect all villages in the state by the end of March 2024. To attract operators, the UPSRTC offers fortnightly payments and has extended the time to bring the bus into operation to 90 days after LOI is issued. The ordinary bus contract is for 10 years, and operators can easily obtain loans by showing the LOI to financial institutions.

#### **Pricing and Load Factor**

The pricing system for operators of bus services by UPSRTC has been designed to ensure fairness, efficiency, and a balance between the interests of the corporation and the operators. The system consists of six categories. Depending on the type of service, this base price may range from ₹ 7 to ₹ 10 per kilometer. This fixed base rate/km is charged by UPSRTC from total EPK which covers their administrative costs of providing the services, including administrative expenses, conductor costs, and taxes.

Unlike a typical Net Cost Contract, UPSRTC's pricing model takes into account the total earnings and earnings per kilometer (EPK) of the operator. After deducting the fixed base price, which varies depending on the service, the remaining amount is paid to the operator. This approach ensures that the operator is paid based on their performance and the revenue they generate.

Operators have the opportunity to earn additional revenue based on the load factor, which is the percentage of occupied seats in a vehicle. If the load factor<sup>28</sup> reaches 75%, the

---

<sup>28</sup>The load factor in public transport refers to the percentage of seats that are occupied by passengers in a vehicle. It is a measure of how efficiently the transportation service is being utilized. For example, if a bus has 50 seats and 40 passengers are on board, the load factor would

operator is eligible to receive a portion of the profit generated beyond that threshold. For instance, if the load factor is 80%, the operator receives <sup>29</sup>50% of the profit above 75%. This encourages operators to strive for higher load factors, which leads to increased efficiency and benefits such as lower costs per passenger and reduced traffic congestion.

By utilizing the load factor as a tool to incentivize operators, UPSRTC aims to motivate them to provide better service and generate additional revenue. Simultaneously, the fixed base price per kilometer protects the corporation from potential losses when operating under low load factors. Regardless of the operator's earnings, UPSRTC receives a fixed base price that covers their administrative and conductor costs. This approach ensures that both parties share the revenue risk, promoting a fair and sustainable business model.

The pricing system also allows for flexibility, considering that buses operate on different routes with varying lengths and seating capacities. Charging ₹ 8.65/km, slightly above UPSRTC's expenditure average administrative of ₹7/km, ensures that potential future cost increases are covered adequately.

Overall, this pricing model incentivizes operators to provide excellent service, keep passengers satisfied, and generate revenue, while also safeguarding UPSRTC's financial interests. It strikes a balance between both parties' needs and fosters a mutually beneficial relationship.

Following are the various type of hired bus contracts by UPSRTC

S. No	Contract Type	Security Deposit by the operator	Maximum Contract Period	Route Length	Base rate per km charged by UPSRTC	Payment to the operator	Additional Payment to the operator
1	Rural Bus Contract Scheme  <b>Seating Capacity:</b> 40-45, 46-51 and 52 or more allowed	₹40,000 (40-45 seats) ₹50,000 (52 and above seats)	10 years	90-100 km (min)  325km (max)	7.95	Payment of the entire amount up to 80% load factor by deducting the amount of base price	50% of the amount above 80% load factor

be 80%. A higher load factor means that the service is being used more efficiently, which can lead to benefits such as lower costs per passenger, profit and reduced traffic congestion.

<sup>29</sup> Load factor at 75% determines that operator is operating at break even.

						from the net income earned by the vehicle.	
2	Seat and Sleeper Bus Contract  <b>Seating Capacity:</b> 27 reclining seats on the floor and 15 sleeper berths	₹75,000	8 years	500 (+/-) 50 km	9.9	Payment of the entire amount up to 75% load factor by deducting the amount of base price from the net income earned by the vehicle.	50% of the amount above 75% load factor
3	Mid Segment Bus Contract  <b>Seating Capacity:</b> Minimum 34 and up to 40 seat capacity	₹75,000	8 years	500 (+/-) 50km	9.3		
4	Air-Conditioned-Sleeper Bus Contract  <b>Seating Capacity:</b> 30 sleeper capacity	₹75,000	8 years	500 (+/-) 50km	9.3		
5	High-End Air Conditioned Bus Contract  <b>Seating Capacity:</b> 43 seats (single axle) and 51 seats (double axles)	₹1,00,000	10 years	550 (+/-) 50 km	9.9		
6	Ordinary (CNG/Diesel Engine) Bus Contract  <b>Seating Capacity:</b> 40-45 and 46-51 seats	₹40,000 (40-45 and 46-51 seats)	Diesel buses up to 5 years and CNG buses up to 08 years	90-100 km (min)	8.85		
		₹50,000 (52 and above seats)		325km (max)			

Table 9 : UPSRTC's various bus hiring schemes



Figure 16 : Mr. Atul Jain, General Manager, UPSRTC sharing UPSRTC's experience on PPP operations

### Key takeaways

UPSRTC's pricing system for bus services strikes a fair and efficient balance between the corporation and operators. With a fixed base price covering administrative costs, the model takes into account total earnings and EPK to pay operators based on their performance. The fixed base price safeguards UPSRTC from potential losses during low load factors. The flexibility of the system accommodates varying routes and seating capacities. Overall, this model promotes excellence, passenger satisfaction, and revenue generation while protecting the financial interests of UPSRTC, creating a mutually beneficial partnership.

### 3.5 Case Study 05: MSRTC's learnings from past experience and procurement of Electric Buses under PPP

The Maharashtra State Road Transport Corporation (MSRTC) has been facing a shortage of buses, and to address this, it has been using the PPP model for bus procurement since 2002. In 2002, MSRTC introduced Shivneri Volvo buses as a Premium AC Class in their fleet on Gross Cost Contract basis. Initially, there was resistance to the idea of procuring buses through PPP as labour unions have been strongly opposing hired buses and insisting that the buses be owned and operated by the STU itself. However, this mindset is gradually changing, especially after the COVID-19 pandemic.

#### Shivshahi AC bus PPP Model

In 2016, the Maharashtra State Road Transport Corporation (MSRTC) started a public-private partnership (PPP) model for its air-conditioned (AC) buses, which was later expanded to include ordinary buses in 2020. Buses under this model have been given a distinct brand identity i.e. "Shivshahi" buses, to help attract ridership. To develop the Request for Proposal (RFP) and contract conditions, MSRTC consulted with suppliers. The payment mechanism was structured with 60% upfront payment after the bill from the



central office and 40% from the division office at the district level. However, issues with delayed payments, fines, and penalties arose, resulting in many operators withdrawing their buses. This not only affected the smooth functioning of the PPP model but also led to banks being hesitant to finance new projects with MSRTC. The challenges faced by MSRTC highlight the importance of effective contract management, including timely payments and incentivizing clauses, to ensure that all parties involved in the PPP model benefit and are incentivized for smooth operations.

## Electric bus procurement under PPP

In March 2023, the MSRTC floated the tender to procure 5150 electric buses under a GCC public-private partnership model in Maharashtra. The MSRTC's decision to procure 5150 electric buses under the PPP model in Maharashtra is a significant step towards promoting sustainable public transportation and reducing carbon emissions. These buses will be branded as "Shiva - E" which will be operated as an economical AC service on intercity routes. Currently, MSRTC is operating 50 "Shiva - E" buses which are procured under FAME II scheme. The tender, which is one of the largest e-bus tenders floated by any single STU, includes both 12-meter and 9-meter buses. To ensure that past mistakes are not repeated, the MSRTC has considered the learnings from previous contracts and has drafted the RFP and contracts with the interests of all stakeholders in mind. This includes considering the concerns of workers' unions, who may view the PPP model as a form of privatization of the STUs. The procurement process will follow the GCC model, and the payment mechanism is expected to be structured in a way that is mutually beneficial for all parties involved.



### MSRTC's "E-Shivneri Bus"<sup>30</sup>

*These buses are operated as a premium AC brand between Mumbai - Pune and Thane - Pune.*

*MSRTC has procured total 150 buses in under FAME II Scheme in 2023. These buses will soon replace diesel based Shivneri bus fleet.*



### MSRTC's "Shiva - E"<sup>31</sup>

*These buses are operated as a economical AC brand on various intercity routes. MSRTC has procured total 50 buses under FAME II Scheme in 2023. The upcoming 5150 electric bus tender is set to expand Shiva - Ebuses in fleet which will be replacing diesel based "Shivashai" AC buses.*

<sup>30</sup> Photo Courtesy: ITDP India

<sup>31</sup> Photo Courtesy: ITDP India



One of the critical factors that determine the success of the public private partnership is ensuring that the cost per kilometre (CPK) of hired buses to be less than the EPK of the State Transport Undertakings (STUs). This is crucial for the PPP model to maintain a deficit-free operation and ensure that the private sector operates efficiently. It is also important to ensure that there is healthy competition in the procurement process while maintaining the quality of buses. In the current scenario, as MSRTC floats the tender to procure 5150 electric buses under a PPP model, it is essential to ensure that the procurement process is transparent and fair.

By carefully balancing the interests of all stakeholders, including end consumers, investors, and operators, the MSRTC hopes to create a successful PPP model that delivers high-quality public transport services to citizens in a sustainable and financially viable way.



Figure 17 : Mr Shekhar Channe, IAS, Vice President, ASRTU; VCMD MSRTC sharing MSRTC's experience on PPP operation

## Key takeaways

1. PPP is being adopted to reduce costs and increase efficiency, with minimum CPK and EPK gap. The PPP model has enabled MSRTC to address the shortage of buses while providing an opportunity for private players to invest in the transport sector.
2. The PPP model's success depends on addressing all stakeholders' concerns and creating a win-win situation for everyone involved. MSRTC must ensure timely payments to operators to prevent them from withdrawing their buses and must provide banks with assurances regarding the payment mechanism to encourage them to finance new projects.

3. Going electric is in line with the government's policies on environmental and passenger comfort considerations. Private partners are expected to share profits with the government, which in turn is expected to reduce CPKM, among other criteria.

### **3.6 Case Study 06: Successful PPP Model for bus operations by BMTC**

Bengaluru Metropolitan Transport Corporation (BMTC) is a government-owned public road transport corporation serving the Bengaluru Metropolitan Region in India. As a wholly-owned entity of the Government of Karnataka, BMTC plays a vital role in providing efficient and reliable transportation services to the city's residents.

Procurement and operations are fundamentally very difficult. Government creates employment in the public transport sector. More than 1 lakh employees are being provided livelihood. In PPP this direct benefit to employees is denied and the governments have to take a hard decision to move away from direct employment to indirect employment. Job security for current employees is a very big challenge in the PPP mode, especially for a STU moving from owned operations to PPPL. The perspective of governments has to change in favour of the PPP models considering the benefits it offers in terms of improved operations, services to passengers. Leadership in the contracting also plays a major role to influence and ensure that PPP models become acceptable to governments.

Choices for electric buses: dry lease, wet lease or AMC of only maintenance getting rid of mechanical staff etc. Balancing existing staff with GCC/NCC and AMC for maintenance is a big challenge for STUs/SPVs.

To deal with these issues, a noteworthy partnership has emerged between BMTC and the joint venture of National Thermal Power Corporation (NTPC) Vidyut Vyapar Nigam Ltd and JBM Auto. This collaboration aims to transform the transportation landscape in Bengaluru by introducing electric buses. As part of the initial phase, a fleet of 90 electric buses, measuring 9 meters in length and accommodating 33 passengers in a non-AC setting, have been deployed. These buses operate on a GCC basis at ₹51.67/km, (which includes the cost of power) with minimum assured utilization of 180 km per day over a 10-year period.

The partnership between BMTC and the operator- Parveen Travels; joint venture, comprising NTPC Vidyut Vyapar Nigam Ltd and JBM Auto, has yielded numerous benefits. NTPC and JBM Auto have taken responsibility for the maintenance and charging infrastructure required for the buses. To ensure the smooth functioning of day-to-day operations, the joint venture has appointed bus operators who supply competent drivers. The bus operator plays a crucial role in managing critical aspects such as driver training, salaries, perks, and benefits, which has resulted in increased productivity. Leveraging the expertise of the bus operator, NTPC and JBM Auto, who may lack experience in driver management, are able to effectively utilize the operator's efficiency. The success of this

partnership serves as a testament to the significance of collaboration and cooperation among all parties involved.



Figure 18 : 9m Non-AC electric bus operated by NTPC-JBM Auto for BMTC<sup>32</sup>

Experts in the field emphasize that the seamless operation of such a system relies on the collective efforts of the investor, principal (in this case, BMTC), and operator (represented by NTPC and JBM Auto). To ensure optimal functioning, it is crucial for all stakeholders to have a shared understanding of objectives, mutual respect, and maintain constant communication. By fostering a collaborative environment, these stakeholders can work together towards achieving a transportation system that not only benefits the city and its residents but also serves as a model for sustainable and efficient public transportation.



Figure 19 : Mr Mohammad Afzal, Parveen Travels, Private Operator for BMTC explaining the PPP case of BMTC

<sup>32</sup> Photo Courtesy: <https://hemantautoclickz.blogspot.com/>

By effectively leveraging each party's expertise and streamlining processes, this collaboration has resulted in improved productivity, reduced costs, and a more sustainable transportation system. It underscores the importance of mutual understanding, respect, and constant communication among all stakeholders to achieve optimal functioning of the system and drive future advancements in public transportation.

Electric buses are proving to be a cost-effective and sustainable solution for public transportation. The cost of operating electric buses stands at ₹ 64.67 per kilometer, inclusive of driver wages, fuel expenses, and conductor costs. This cost is notably lower than the operating cost of in-house diesel buses, which amounts to ₹ 68.53<sup>33</sup> per kilometer. With the ever-increasing price of diesel, the gap between the per kilometer cost of diesel and electric buses is expected to widen further in the future. Therefore, by embracing and expanding their electric bus fleet, organizations like BMTTC (Bangalore Metropolitan Transport Corporation) can effectively safeguard themselves against rising fuel expenses while promoting environmentally friendly transportation options.

### **3.7 Case Study 07: Enhancing Public Transport in Kerala: Exploring the Role of Private Operators and Accelerating Bus Procurement and Operations**

The public transport system in Kerala comprises both the Kerala State Road Transport Corporation (KSRTC) and private bus operators. Private operators hold a significant share in bus operations. The Kerala State Road Transport Corporation (KSRTC) and private bus operators have different shares in bus operations, with private operators occupying around 23 to 26 percent. Despite the inefficiencies associated with state transport undertakings (STUs), the government needs to recognize their importance and work towards their restructuring. Kerala has witnessed a decline in the number of private buses over the years especially after covid.

Additionally, the government has made substantial investments in the procurement of electric buses. However, the implementation and adoption of electric buses have faced challenges.

Concerns about the future have arose, especially after COVID with the scenario of roads becoming congested and dangerous due to the proliferation of bikes and other vehicles as become a big issue. In light of this, the need to strengthen the public transportation system is emphasized. This can be achieved by converging all government schemes and restructuring the State Transport Undertakings (STUs).

The government's investments in purchasing electric buses have faced challenges. One challenge highlighted is the lack of financial viability of a 30-seater electric bus as operator quoted rate of Rs. 43/km which was higher than the KSRTC's earnings per km. KSRTC is now operating 130 electric buses in the city of Trivardum funded by Smart Cities Mission on outright purchase model. Electric buses are proving to be a highly

---

<sup>33</sup> [auto.hindustantimes.com](http://auto.hindustantimes.com)



cost-efficient choice for KSRTC. These buses are operated at ₹23/km<sup>34</sup> which includes both power expenses and staff costs. In comparison, diesel buses incur a higher operating cost of ₹37<sup>35</sup> per kilometer.

### **KSRTC Swift Model**

KSRTC Swift Limited is a government of Kerala incorporated company that plays a crucial role in supporting the efficient operation of the Kerala State Road Transport Corporation (KSRTC) in its long-distance services. Under an agreement with KSRTC, KSRTC Swift Limited provides the necessary infrastructural, technical, managerial, and operational support to ensure the smooth functioning of KSRTC's bus services. This includes the efficient operation of new buses funded by the Kerala Infrastructure Investment Fund Board (KIIFB), buses acquired through state plan schemes and schemes of both the state and central governments, as well as buses obtained through sponsorship and hire. The company operates under an Intelligent Central Control Centre specifically designed for KSRTC. Additionally, KSRTC Swift Limited undertakes the implementation of various projects and schemes assigned by the government as required. KSRTC Swift currently employs temporary workers on daily wages.



*Figure 20 : KSRTC Swift Electric Buses<sup>36</sup>*

KSRTC Shift employs temporary employees on daily wages, resulting in a significant cost reduction of approximately 60% on salaries. KSRTC Swift is planning to procure 550 electric buses in its fleet. To finance the purchase of 550 electric buses, KSRTC is obtaining a loan from its own institutions. A new model is being implemented, wherein operators being requested to fix the OpEX rates permanently, starting with 25 rupees per kilometer in accordance with the CESL tender. The capital cost for the buses can go up to 1.25 crore

<sup>34</sup> <https://keralakaumudi.com/>

<sup>35</sup> <https://rto.care/>

<sup>36</sup> Photo Courtesy: <https://www.thehindu.com/>

rupees. The registration of the vehicles can be in the name of KSRTC, the supplier, operator, or consortium. If registered under the supplier or consortium, a bank guarantee of 110% of the cost is required, diminishing by 10% each year, with the final year guarantee being 10 lakh rupees. KSRTC has released an Expression of Interest (EOI) and held private meetings with 10 potential rights, receiving positive feedback. To ensure viability, KSRTC has requested the Ministry of Housing and Urban Affairs (MoHUA) secretary for a demand subsidy of 20 rupees per kilometer, which would significantly reduce operating costs.

### **3.8 Case Study 08: Transforming Public Transportation: A Case Study of Kalyan Dombivali Municipal Transport Undertakings (KDMTU)**

The Kalyan Dombivali Municipal Transport Undertakings (KDMTU) is responsible for operating buses within the jurisdiction of Kalyan Dombivali Municipal Corporation and neighboring Municipal Councils such as Bhiwandi, Ulhas Nagar, and Ambernath.

Based on previous experience of KDMTU, it was observed that the NCC model was not as effective, prompting the adoption of the GCC model. The GCC model offers increased security for private partners involved in bus operations. As part of the National Clean Air Program (NCAP) initiated by the 15th Finance Commission, KDMTU is set to receive 207 electric buses out of the allocated 3700. This procurement aims to not only enhance mobility security in Kalyan-Dombivali but will also address environmental concerns and enhance air quality in the region.

The selected model for this endeavor is the Wet Lease model, with the 15th Finance Commission ensuring viability gap funding. This provides a steady and guaranteed monthly income for the private partners engaged in bus operations. The implementation of the Wet Lease model is a response to the high demand for buses, particularly electric ones, as the existing supply falls short of the requirements. The twin cities of Kalyan-Dombivali, with a population of 2.5 million, necessitate 800-900 buses, but currently, only 141 diesel buses are in operation in KDMTU's fleet. To bridge this supply-demand gap, GCC model is being pursued, with a support from National Clean Air Program (NCAP) KDMTU's will be procuring 207 electric buses with a finalized tender cost of 56 rupees per kilometer.



Figure 21 : Mr Deepak Sawant, General Manager KDMTU explaining the case of KDMTU

In addition to the model selection, route rationalization has been undertaken to optimize operational efficiency. By integrating the transportation networks of neighboring corporations and municipal councils, resources can be utilized more effectively and the overall system can be streamlined.

KDMTU emphasizes the importance of advanced planning and provision of supportive infrastructure development, particularly for electric buses, to prevent bus idling due to inadequate infrastructure. This includes establishing suitable depot sites, ensuring availability of necessary electrical equipment, and offering electricity concessions to promote environmentally friendly transportation options. Furthermore, the proposal suggests providing initial subsidies to incentivize operators and encourage them to deliver efficient and sustainable public transportation services.

### **3.9 Case Study 09: Enhancing Efficiency and Sustainability in Public Transport: A Case Study of Pune Mahanagar Parivahan Mahamandal (PMPML)**

Pune Mahanagar Parivahan Mahamandal (PMPML) is a public limited company jointly owned by Pune Municipal Corporation (PMC) and Pimpri Chinchwad Municipal Corporation (PCMC). It is responsible for operating public transport services in Pune, Pimpri-Chinchwad, and the Pune Metropolitan Area. With a fleet of 2200 buses, PMPML operates on a Gross Cost Contract basis, with 55% of the buses being operated under this model and the rest are owned and operated by PMPML. The hired fleet consists of 732 CNG buses and 458 electric buses. Until the late 1990s, Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation had separate Transport Undertakings, namely PMT and PCMT. However, both undertakings faced declining ridership and mounting losses due to a significant shift towards two-wheelers as a preferred mode of transportation. In 2007, to address these issues and improve services, PMPML was formed by merging PMT and PCMT. The merger aimed to reduce competition, optimize resources, and eliminate inefficiencies.

## **The First PPP Model and its Challenges**

In 2008, PMPML initiated its first Public-Private Partnership (PPP) model when it received buses funded by the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Private bus operators were appointed to maintain and operate the buses, while PMPML owned the buses. However, this model faced challenges due to the lack of expertise, capacity of the operators and negligence towards STU owned buses. The operators' drivers drove the buses harshly, leading to frequent breakdowns. Additionally, the operators struggled to maintain the buses on time, resulting in low fleet utilization. As a result, PMPML terminated the contract.

## **Switch to the Gross Cost Contract Model in 2014**

Subsequently, PMPML transitioned to the Gross Cost Contract model, where private operators provided buses, drivers, maintenance, and fuel, while farebox collection remained with PMPML. PMPML allocated land areas in their existing depots to the operators for parking, maintenance, and fueling. By utilizing PMPML's well-established CNG fueling stations, the operators could refuel the buses at a subsidized rate. However, the absence of a target fuel efficiency in the contract for the operators prevented PMPML from achieving fuel savings comparable to their owned buses, which had fuel efficiency targets.

## **Payment and Monitoring**

PMPML follows a payment cycle of 30 days, with 50% of the payment released in the first 15 days and the remaining 50% in the next 15 days. Penalties, ranging from 5% to 10%, are imposed for non-compliance. However, the lack of an Intelligent Transport Management System (ITMS) makes it challenging to track and rectify penalties, leading to potential disputes and arbitration. PMPML recognizes the importance of ITMS not only for passenger information and safety but also for tracking operator defaults. Efforts are underway to restart the command and control center with an enabled ITMS in all buses for improved monitoring and enforcement.

## **Maintaining a Balanced Fleet Composition**

PMPML places great emphasis on achieving and sustaining a balanced ratio between hired and owned buses in its fleet. The organization recognizes that excessively relying on private operators for the majority of its buses may lead to potential issues such as monopolistic behavior or undue influence in decision-making. PMPML has experienced various instances where strikes by operators or their staff have caused significant disruptions to its transportation services.. By capping the ratio of hired buses at ~50%, PMPML effectively safeguards against any negative consequences that could arise from an overreliance on external operators.

## **PMPML's Electric Bus Initiative**

In 2019, PMPML embarked on an ambitious endeavor to introduce 120 electric buses into its fleet. This initiative was made possible through joint capital expenditure (capex) funding from the Smart City Mission, Pune Municipal Corporation (PMC), and Pimpri Chinchwad Municipal Corporation (PCMC). Under the Gross Cost Contract model, the bus operators took on the responsibility of providing the buses, setting up charging stations,



acquiring allied electrical equipment, recruiting drivers, and maintaining the buses. PMPML provided land to the operators, who were also tasked with developing depot facilities. The cost of developing the depot facility was factored into the per kilometer (km) rate for operating the buses. This unique approach allowed for the elimination of capital expenditure amounting to approximately Rs. 70-80 crore, which has now spread across the 12-year contract in per km rate. PMPML facilitated the provision of electricity and high-tension (HT) electricity connections to these depots with support from the Maharashtra State Electricity Distribution Company Limited (MSEDCL). PMPML excluded the cost of electricity from the per km rate. Currently PMPML receives a subsidized electricity rate of Rs. 4 per unit.

## **Challenges and Recommendations for Infrastructure Development**

Despite the strides made in adopting electric buses, PMPML encountered challenges due to inadequate pre-planning for civil and charging infrastructure. PMPML acknowledged that a lack of technical expertise and support in pre-planning for civil infrastructure from local, state, and central agencies impeded their ability to provide sufficient infrastructure before the procurement of ebuses. Delays in depot and charging infrastructure readiness resulted in prolonged periods of bus idleness. Furthermore, the lack of technical expertise in determining power requirements hampered the development of the necessary grid infrastructure, leading to power shortages that disrupted operations.



*Figure 22 : PMPML Electric Bus Depot<sup>37</sup>*

In light of these challenges, PMPML recommends that state and central agencies provide comprehensive guidelines or model documents to establish a roadmap for electrification. This roadmap would encompass factors such as fleet requirements based on population growth, land availability, charging infrastructure needs, power requirements, total investment, and substantial viability gap funding requirements. Implementing such a roadmap would ensure uninterrupted cash flow, enabling operators to receive timely payments. To achieve efficient fleet electrification, it is essential to anticipate future

---

<sup>37</sup> Photo Courtesy: ITDP India

requirements by focusing not only on procuring buses but also on developing supportive infrastructure for optimal operations.

### **Learnings from Case Study**

The case study of PMPML highlights the journey from struggling transport undertakings to an efficient and sustainable transport system. They transitioned to the Gross Cost Contract model, maintaining a balanced fleet and minimizing disruptions. Their electric bus initiative reduces capital expenditure. However, infrastructure and technical expertise challenges have caused delays and power shortages. The study also emphasizes the importance of proactive planning, technical expertise, and the implementation of an ITMS for efficient monitoring and payment systems.

## 4. Impact of Aggregation of E Buses through PPP in India

The need for more buses in India is pressing, and it has been established that public-private partnerships (PPP) are the way forward. Several cities, such as Mumbai and Bangalore, have transitioned from in-house operations to gross cost contract-based procurement and operations, as well as transitioning from diesel or CNG buses to electric buses. This transition has resulted in significant cost reduction benefits, with cities seeing as much as a 30-35% reduction in cost.

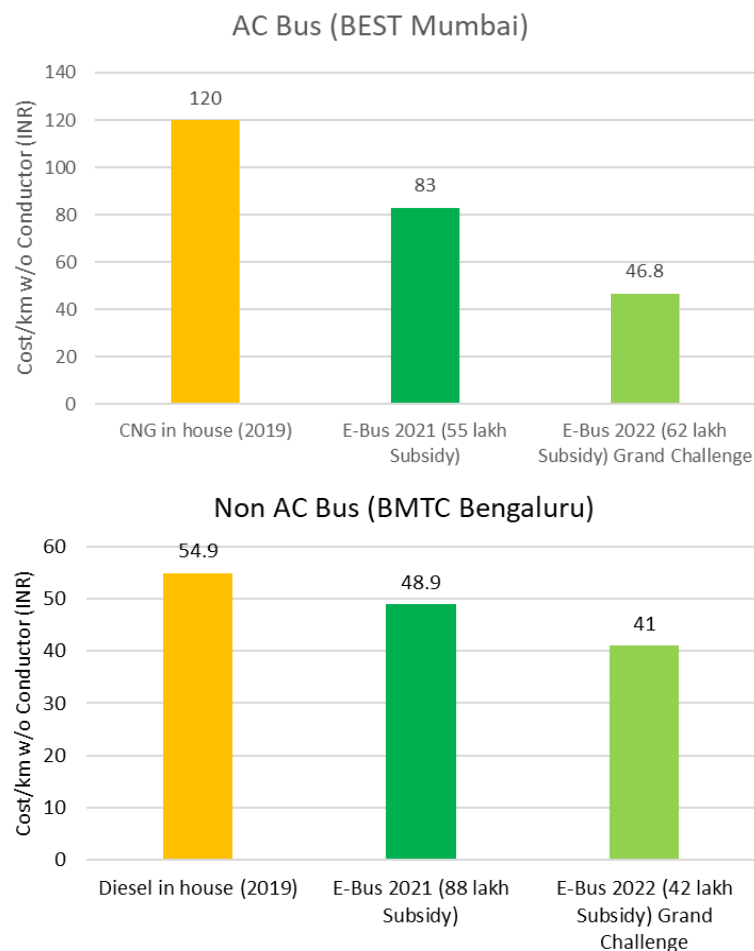


Figure 23 : Comparison of ICE and Electric Buses per km operating cost in Mumbai and Bangalore

The transition from conventional diesel and CNG-based operations to GCC-based electric bus operations in 2021 has yielded significant cost reductions for BEST and BMT. The implementation of the GCC model has allowed for the unbundling of various components, eliminating the financial burden associated with major cost-intensive elements such as vehicle ownership, drivers' salaries, and maintenance. Moreover, the lower cost of electricity per unit compared to diesel and CNG, along with the support of FAME 2 and State Government subsidies, has further contributed to cost savings. As a result, BEST and

BMTC were able to save 30% and 11%, respectively in their operational costs during the 2021 electric bus procurement, compared to their previous diesel and CNG procurements.

In 2022, the Grand Challenge organized by CESL successfully aggregated demand across India and standardized procurement processes. Through this initiative, BEST and BMTC achieved a significant 43% and 16% cost reduction, respectively, compared to their previous e-bus procurement in 2021, which did not involve demand aggregation. The standardized design and aggregated procurement of electric buses, as demonstrated by the Grand Challenge, have resulted in 31 -35% reduction for cities like Delhi, Kolkata, Bengaluru, Surat and Hyderabad, greater economies of scale for manufacturers, leading to substantial savings for cities. It has been estimated that these cities have saved approximately ₹10,870 Cr through the lower prices realized through the Grand Challenge, emphasizing the positive impact of standardized design and procurement on cost optimization.

#### 4.1 CESL's Demand Aggregation Model

CESL (Convergence Energy Services Limited), a wholly-owned subsidiary of Energy Efficiency Services Limited (EESL), has been playing a significant role in promoting electric mobility in India. They have been working closely with State Transport Undertakings (STUs) to facilitate the adoption of electric buses.

CESL's demand aggregation model is a procurement model that involves bringing together the demand of multiple buyers to purchase goods or services in bulk to get better prices. The demand aggregation model has allowed CESL to bring together the demand for electric buses from multiple State Transport Undertakings (STUs) and other buyers.



Figure 24 : Mr. Vishal Kapoor, IRS, CEO, CESL explaining the CESL's demand aggregation model

In the Grand Challenge for electric buses, CESL was able to reduce the prices of buses by 31% as compared to diesel and 27% as compared to CNG buses. CESL has also conducted tenders for around 16,000 electric buses under the GCC framework, which has helped to reduce the prices of electric buses and make them more affordable for the masses. Currently, the company is conducting a tender for 3,700 electric buses under a dry lease model, which is expected to bring down the prices of electric buses further.

### **Impact of 10-15 years Contract**

CESL recognizes the need for long-term financing in PPP projects for their viability. However, most domestic lending institutions in India only provide financing for up to 12 years, with a few exceptions, such as Power Finance Corporation and Rural Electrification Corporation providing up to 15 years. Multilateral banks are more likely to provide longer-term loans. Therefore, it is imperative that the market sees the success of PPP projects over a period of 10-12 years to develop confidence among financiers. It is possible to extend the contract length to 15 years with proper planning and execution of the project.

### **Impact of Customized Requirements by STUs**

CESL's focus is on electric buses and making them more standardized. The contracts so far have included low-floor, high-floor, AC, and non-AC versions of 7, 9, and 12-meter buses. However, they may be unable to accommodate requests for non-standard buses unless there is a huge demand. Their aim is to have more standardized varieties with greater numbers before expanding into smaller versions or other variations.

CESL's focus on scaling the production of electric buses through standardization is a strategic move to achieve economies of scale and lower costs. By creating standard models, manufacturers can streamline the production process and reduce the costs of materials, labour, and logistics. Moreover, standardization helps maintain quality and consistency across the fleet, which can improve the overall performance of the buses.

### **Demand for Buses from Smaller States and Institutes**

The adoption of electric buses in smaller cities would not only help reduce air pollution but also help in reducing the dependence on fossil fuels. CESL's demand aggregation model, coupled with standardized design, can help in reducing the prices of buses further, thereby making them more affordable for smaller states and institutes.

### **Demand aggregation for private operators:**

CESL is currently not looking at aggregating demand from private bus operators due to the higher risk perception associated with smaller operators. However, they are exploring other risk-free segments, such as tarmac buses. The private bus sector has significant potential, with around 15.35 lakh buses across the country<sup>38</sup>, compared to STUs holding only 1,46,355<sup>39</sup>. Despite this potential, CESL is currently focused on getting STUs on board and exploring other segments that may not have issues with payment security.

---

<sup>38</sup> Bus & Car Operators Confederation of India

<sup>39</sup> Handbook on Fleet by STUs in India by ASRTU

### Linking up Contracts with the Digitization of the STUs

By digitizing the STUs, the procurement process becomes more transparent, and the project becomes more bankable. This means that the entire process becomes more efficient, which can help reduce the prices of buses further. Digitization of STUs involves using digital technologies to streamline their operations, increase their efficiency, and enhance their performance. This can be achieved by adopting various technologies such as automated fare collection systems, real-time vehicle tracking systems, and other smart transportation systems. This can make the process more efficient and help reduce the costs associated with the procurement process.

## 4.2 National Electric Bus Program: Aggregation without subsidy

The National Electric Bus program aims to bring 50,000 electric buses into the public transport system. However, tendering of 6,465 buses has shown a cost increase of 24-44%/km as compared to the previous Grand Challenge tenders, making the implementation of the program challenging. The latest tender has shown a reduction in the number of bids received, and leading companies such as Tata Motors and Olectra have not participated.

### Key reasons for the cost increase

- **Lack of subsidy:** The lack of subsidy has resulted in the higher cost of procurement, which the operators pass on to the government.
- **More realistic operations cost estimates:** Since no STU in India has completed a full cycle of ebus operations, there is a need for a better understanding of the cost involved in GCC operations.
- **Higher risk premium due to limited payment guarantee:** The higher risk premium is due to limited payment guarantees from the government. Operators require a guarantee of payment to offset the risk associated with the procurement process. The current limited payment guarantee increases the risk premium, which ultimately leads to higher procurement costs.

Type of bus	No. of bids received		Price quoted per km (INR per km)		% increase
	With Subsidy (March 2022)	W/O Subsidy (Dec 2022)	With Subsidy (March 2022)	W/O Subsidy (Dec 2022)	
12m LF AC	4	3	47.49	62.70	32%
12m LF Non-AC	4	2	43.49	54.30	25%
9m LF AC	4	2	39.88	56.87	43%
9m SF AC	4	2	37.9	54.46	44%

Table 10 : Comparison between rate per km quoted by operators for E- Buses with Capex Subsidy and No Subsidy.

## **5. Issues and challenges in Financing Public Buses through PPP in India**

Public-private partnerships (PPP) have become increasingly popular in the transportation sector, with the primary objective of enhancing efficiency and improving service quality for passengers while also shifting the burden of financing to private entities. However, financing remains a significant challenge for private players involved in PPPs. By exploring different financing options and discussing ways to improve financial viability, sustainable partnerships can be established that benefit all stakeholders involved.

### **5.1 Overcoming Financing Challenges in Public Transport**

This subchapter will provide an overview of challenges faced in obtaining financial data from State Transport Undertakings (STUs) and Urban Local Bodies (ULBs) and the need for payment security mechanisms in the financing process. The lack of a nodal agency for electric buses and the absence of a mechanism to ensure timely maintenance has led to the failure of multiple projects.

#### **5.1.1 Financial Data**

Operators and financial institutions have reported difficulty in obtaining financial data from State Transport Undertakings (STUs) and Urban Local Bodies (ULBs). This lack of data creates a problem for lenders who require information on the financial health and experience of these entities before providing financing. As a result, the lack of data can affect the ability of STUs and ULBs to secure financing, resulting in a decline in service quality and ridership.

The financial health of STUs and ULBs is critical for the success of PPP projects in public transport, as lenders need to be confident that they will receive their payments on time. However, if STUs and ULBs do not provide financial data, it becomes challenging for lenders to assess the risk associated with the projects, which can lead to a higher cost of capital and lower availability of financing.

STUs and ULBs need to provide more transparent financial data, which can help lenders assess the risk associated with the project accurately. This, in turn, can lead to more competitive financing terms, lower cost of capital, and, ultimately, a better quality of service for riders.

#### **5.1.2 Payment Security Mechanisms**

Payment security is a critical issue in the financing process, as private operators require timely payment to sustain their business and continue providing services. To address the issue of payment security, various payment mechanisms have been suggested, including a state support undertaking, a budgetary allocation, a partial credit guarantee mechanism, and the creation of an agency to ensure payment security.

- A state support undertaking is a commitment by the state government to provide financial support to the PPP project, if required, to ensure timely payment to the private operator.
- A budgetary allocation is a provision made in the state budget for the PPP project, which can be used to make payments to the private operator.
- A partial credit guarantee mechanism is a scheme where the government provides a partial guarantee to the lender for the repayment of the loan in case of default by the private operator. This mechanism reduces the risk perception of the lender and encourages them to provide financing to the project.
- The creation of an agency to ensure payment security involves the establishment of a dedicated agency that will be responsible for ensuring timely payment to the private operator. The agency will monitor the financial health of the STU/ULB and take necessary actions to ensure payment security.

The use of appropriate payment mechanisms can encourage private sector participation in the financing process and promote the sustainable provision of quality services to the public.

### **5.1.3 Nodal Agency for Electric Buses**

The lack of a nodal agency for electric buses has been identified as a major hurdle in the financing, procurement, and operation of electric buses. A nodal agency for electric buses, similar to the National Highways Authority of India (NHAI) or the Solar Energy Corporation of India (SECI), can provide credibility and ensure the smooth functioning of the financing process. It can act as a single point of contact for all stakeholders involved in the procurement and operation of electric buses, including the government, private operators, financiers, and technology providers.

The nodal agency can play a crucial role in addressing the financing challenges associated with electric buses. It can provide guidance to STUs and ULBs on financing options, such as debt and equity financing, lease financing, and public-private partnerships. It can also assist in the development of financing structures, including the creation of special purpose vehicles (SPVs) and the establishment of dedicated funds for electric buses.

The nodal agency can also oversee the procurement process of electric buses, from the preparation of tender documents to the selection of suppliers. It can ensure that the procurement process is transparent, competitive, and based on the best value-for-money principle. It can also assist in the standardization of electric buses, which can help in reducing procurement costs and enhancing the interoperability of electric buses across different regions.

Finally, the nodal agency can ensure the effective operation and maintenance of electric buses. It can develop and enforce standards for bus operations, such as safety and performance standards. It can also provide technical support and training to STUs and ULBs on the operation and maintenance of electric buses.



### **5.1.4 Maintenance of Buses**

The maintenance of buses is a critical issue that needs to be addressed to ensure the efficient operation of the transport system. There is often a lack of adequate resources, technical expertise, and experience among the ULBs and STUs to maintain buses in a timely and effective manner. This can lead to increased downtime, lower reliability, and higher maintenance costs, ultimately affecting the ridership and revenue of the transport system.

To address this issue, there is a need for a mechanism to ensure that the ULBs and STUs maintain the buses in a timely and effective manner. One way to do this is by introducing maintenance contracts with private operators who have the technical expertise and experience to maintain the buses, especially electric buses. A maintenance contract can specify the scope of maintenance work, the performance standards, and the payment mechanism.

A performance-based payment mechanism can incentivize private operators to maintain electric buses effectively and efficiently. Under this mechanism, payments are linked to the performance of the buses in terms of reliability, availability, and maintainability. The private operator will be responsible for maintaining the buses to a certain standard and will receive payment based on their performance. This can help to ensure that the buses are well-maintained and operated efficiently, leading to improved service quality and ridership.

## **5.2 Strategies for Financing Buses in India**

The development of bus projects involves a range of challenges, including financing issues, inadequate infrastructure, and limited technical knowledge, especially in the case of electric buses. One of the key challenges in financing electric buses is the lack of confidence from banks in the credibility and credit ratings of state transport undertakings (STUs). Additionally, there is a shortage of operators capable of handling large tenders, and frameworks for accessing concessional financing may not be effective.

To overcome these challenges, a holistic approach to project design is necessary, which includes not only the buses themselves but also the necessary infrastructure for charging and maintenance. Development Finance Institutions (DFIs) like KfW (Kreditanstalt für Wiederaufbau) and World Bank provide investment financing for infrastructure projects. In the context of public transport, DFIs can play a crucial role in providing financing for electric buses. However, financing electric buses is a challenging task due to several limiting factors, such as banks' lack of confidence in STUs' credibility and credit ratings, insufficient operators for large tenders, and potentially ineffective frameworks for accessing concessional financing.

To overcome these challenges, a holistic approach to project design, including buses, charging infrastructure, and depots, must be taken. This means that the entire project should be designed and planned together, taking into account the specific requirements of each component. For example, the design of charging infrastructure should consider

the bus routes and schedules, while the design of depots should consider the size and number of buses.



Figure 25 : Ms Swati Khanna, KfW explaining strategies to finance STU's through DFI

DFIs like KfW can help in the financing of electric buses, but a holistic approach to project design is crucial to ensure the success of the project. This approach can help in identifying the specific needs of each component and can lead to more efficient and effective project implementation. By taking a holistic approach, the project can be designed to meet the specific needs of the community it serves while also ensuring its sustainability and financial viability in the long term.

The government needs to prioritize providing financing for buses, and state governments and STUs (State Transport Undertakings) should leverage the financing available to transition to electric vehicles successfully. Private sector participation is also necessary for the successful implementation of PPP (Public-Private Partnership) projects in the public transport sector. However, financing for the private sector cannot be provided directly by DFIs (Development Financial Institutions). Therefore, STUs must manage and ensure results by channelling financing through them.

The energy and electricity sector is also an important player in the transition to electric vehicles. The BEST Undertaking, which is the only STU in India that handles both the bus and energy aspects, serves as a good example. Other states may need to partner with private energy players to ensure a successful transition.

## 5.3 World Bank Financing Instruments and Preparing a Project Report for Development Finance Institutions

### World Bank Financing Instruments

Leveraging financing through the World Bank's three financing instruments -

1. Program for Results (PforR),
2. Investment Project Finance (IPF)
3. Development Policy Loan (DPL)

The PforR and IPF instruments are similar in nature and provide financing for investment projects in infrastructure and services, including public transport. However, PforR allows for procurement to be done according to state requirements.



*Figure 26 : Dr Ravi Gadepalli, Consultant World bank explaining ways to finance PPP projects through DFI*

IPF is focused on the medium to long-term (5 to 10-year horizon) and supports a wide range of activities, including capital-intensive investments, service delivery, credit and grant delivery [including micro-credit], community-based development, and institution building. This includes support to analytical and design work in the conceptual stages of project preparation, technical support and expertise during implementation, and institution building throughout the project.

DPL, on the other hand, is designed for policy transformations and provides financing to support reforms in policy and governance frameworks related to public transport.

Leveraging financing through these instruments is considered an easier approach as the World Bank has a clear and transparent process for financing, and it can provide technical assistance to the governments and other stakeholders involved in the project. Moreover, these instruments have proven to be successful in financing public transport projects in various countries around the world.

### **5.3.1 Preparing a Project Report for DFIs**

The project report is a critical component for securing financing from Development Finance Institutions (DFIs) like the World Bank and KfW. These DFIs often require a

detailed project report that outlines the scope of the project, including the program report and the expected outcomes. The report should also include the financing plan and the procurement process, among other things.

To support the preparation of the project report, DFIs may provide grant financing to the government or other stakeholders. This financing can be used to cover the costs associated with conducting feasibility studies, engaging consultants, and preparing the necessary documentation.

It is important to note that the approval process for DFIs has fixed timelines but sometimes takes longer due to back-and-forth discussions between the government and the DFI. However, the time taken is worth it as it brings other benefits, such as increased transparency and accountability in the procurement process and improved project outcomes.

In Chennai and Tamil Nadu, the World Bank and KfW are currently working on similar projects for electric mobility. By leveraging financing through these institutions, state governments can improve their public transport systems and reduce their carbon footprint.

### **5.3.2 Role of World Bank Financing**

In Chennai, the World Bank has partnered with the state government to improve the city's public transport system, which includes a bus program. The World Bank is not providing the entire financing for the project but is only contributing a small portion of it to de-risk the project and attract more private capital. This means that World Bank financing is used to make the project more attractive to private investors who might be hesitant to invest due to the perceived risks involved.

As part of the project, the World Bank provides technical assistance to create a public transport service contract between the state government and the state transport undertaking (STU). The service contract will help to ensure that the STU delivers the required level of service, and it will also include performance indicators to measure the STU's performance. The contract will help to improve the accountability and transparency of the public transport system, which can help to build trust among investors and other stakeholders.

The state finance department's support is also crucial to the success of the project. The department's support can help to ensure that the project is adequately funded and that the funds are allocated appropriately. A well-structured business plan is also under preparation to ensure the sustainability of the project. The plan should include performance indicators, revenue and cost projections, and risk management strategies, among other things. A well-designed and well-executed business plan can help to build investor confidence and attract more private capital to the project.

### **5.3.3 State Government Prioritization**

The state government should prioritize public transport and provide budget allocations for it. One way to do this is by creating a separate budget head for public transport, which can take care of viability gap funding and streamline PPP contracts. This ensures that adequate financial resources are allocated for the development and maintenance of public transport infrastructure.

DFI loans can also help unlock finance and bring about necessary institutional and structural changes in the public transport sector. DFIs like World Bank and KfW offer investment financing to support public transport projects, which can help bring in private sector involvement and expertise. These loans can be used for the development of new infrastructure, procurement of buses and equipment, and upgrading existing facilities.

State governments should actively explore private sector involvement in public transport projects. PPP contracts can help leverage private sector investment and expertise, improving service quality and efficiency. However, these contracts should be designed to balance public and private interests, with the state government retaining a degree of control over the project.

## 6. Recommendations

The successful implementation of public-private partnerships in the transportation sector requires a multi-faceted approach that considers various factors beyond just cost. It is crucial to address ethical concerns, choose the right model, provide IT-based buses and AFC (Automatic Fare Collection) systems, and involve tax consultants in vetting the contracts to avoid different interpretations of tax liability that can result in huge penalties for the contractor's contracts. Partnerships between public and private players should be prioritized with defined roles and responsibilities based on their expertise, such as STUs focusing on planning, regulatory and monitoring aspects. In contrast, private operators can manage ground operations. Strong leadership is required to manage contracts and ensure sustainability for all stakeholders involved.

By adopting a holistic approach and prioritizing public transport, India can become a global leader in public transport services, especially with cleaner buses like electric. The establishment of a nodal agency for electric buses and government support, along with DFIs as a source of financing, can help address financing challenges and improve project sustainability. State governments should actively explore private sector involvement to improve the overall sustainability of the project, leading to a sustainable and efficient transport system in India.

Following are the key recommendations for the successful way ahead of PPP in bus operations:

- Long-term contracts of 10-12 years or longer, especially for electric buses, are necessary for effective service delivery in STUs
- **Penalty Clauses and Incentive Clauses:** Payment guarantee mechanisms provided by STUs like DIMTS are crucial for the success of any PPP contract. Payment security is crucial in PPP financing, and various mechanisms, including state support undertakings, budgetary allocations, and partial credit guarantees, have been suggested to ensure timely payment to private operators. An incentive and penalty system for private players can improve performance and thereby the service levels and ridership.

There is no incentive scheme in place for the proper implementation of Service Level Agreements (SLAs). However, penalties administered online within a few days can assist operators in accurately identifying and rectifying penalties in a timely manner, as exemplified by DIMTS's ITMS System. The manual processes involved in imposing penalties operate in an ad hoc manner. Although agreements specify penalty priorities, the State Transport Undertakings (STUs) do not adhere to them. All contracts heavily favor the STUs, lacking an appeal mechanism for penalties and prohibiting arbitration in the case of significant penalties. The entity responsible for levying the penalties on STUs is a major question

- Financial planning is essential, and setting up dedicated transport funds and digitization of STUs can improve the transparency and bankability of projects. The creation of a separate budget head for public transport can ensure adequate financial resources for the development and maintenance of public transport infrastructure and streamline PPP contracts.
- **Restructuring of STUs:** Transforming STUs from operators to managing authorities with a focus on service planning, scheduling, customer engagement, and monitoring of contracts is important. Ground activities like staff management, bus operations and maintenance should be the responsibility of bus operators.
- Following a partnership approach: Drafting the RFP and contracts with the interests of all stakeholders in mind. The present electric buses contracting system has two contracts: one between STUs and OEMs and another between OEMs and operators. The two contracts take care of the supply of buses, charging at depots and operation of buses. Another area which is in the domain of STUs/SPVs is providing upstream connection which again shall be outsourced to another partner on per/km basis so that this capital investment need not be done by STUs/SPVs. A detailed study is required and a procedure is to be established in this regard.
- **ITS for performance management** is recommended. Online verification and payments shall be a part of the contract which can remove a lot of hassle.
- **Integration of ITS systems** for STUs and operators, who do not have proper IT infrastructure. This issue will have to be sorted out for better implementation of PPP contracts and execution process
- **Online difficulties:** Proper integration of the online infrastructure and physical infrastructure is crucial for the efficient functioning of GPS timings, route validation, and drivers' adherence to stops. The effectiveness of these systems heavily relies on the connection between the online and physical components. Unfortunately, there are instances where the technology is not supported by real-life situations, leading to unjust penalty deductions. For instance, designated bus stops that lack landmarks, shelters, or are missing from the route often result in drivers being fined for skipping them, despite a lack of proper justification.
- **Agreements with manufacturers:** Agreements have to be studied properly before execution. Once signed there is no flexibility for changes. The agreements are for 10-12 years and not tried and hence the delivery of services has to be perfect even after 10 years.
- Ethical considerations regarding labour welfare and job security must be addressed, to retain drivers who play a critical role in the success of the project. The government must ensure that the terms and conditions of the concession agreement include provisions for fair labour practices and appropriate wages.



- Cost per kilometre should be determined based on various factors, and financing and charging infrastructure for electric buses must be addressed.
- The fixed cost per kilometre for the entire contract period with annual revision of fees based on index value for manpower cost and other consumables should be determined to make it easier for the government to allocate viability gap funding in annual budgets.
- Ensuring the timely and effective maintenance of electric buses is essential for the success of PPP in public transport. By introducing maintenance contracts and performance-based payment mechanisms, the ULBs and STUs can improve the sustainability and efficiency of the transport system.
- The establishment of a nodal agency for electric buses can provide credibility, guidance, and coordination to the financing, procurement, and operation of electric buses.
- The latest audit report and financial data of STUs should be made available online to improve project bankability.
- To ensure the successful financing of public transport projects, a shift towards a holistic approach is necessary, which includes financing for the entire project rather than just vehicles, and exploring financing options beyond conventional banks, such as NBFCs and DFIs, with a focus on project design that takes into account all necessary components like buses, charging infrastructure, and depots.

## Annexure

### Annexure A : Fleet details of SRTUs (Fuel Type-wise)

Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
1	Ahmedabad MTS	123	52		175	122	500		622	797
2	Ahmedabad Janmarg				0	335			335	335
3	Andaman & Nicobar	276			276	38		24	62	338
4	APSRTC	8170	215		8385	2633		64	2697	11082
5	Arunachal Pradesh	377			377	10			10	387
6	Assam STC	876	1	15	892				0	892
7	BEST Undertaking	280	1282	6	1568	280	930	404	1614	3182

Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
8	Bhubneshwar-Puri (CRUT)	30			30	310		50	360	390
9	Bihar SRTC	482	70		552	6		25	31	583
10	BMTC	6112			6112			390	390	6502
11	Calcutta STC	888			888				0	888
12	Calcutta Tramways	389			389				0	389
13	CTU	570			570			80	80	650
14	DIMTS				0		3413	94	3507	3507
15	DTC		3637	2	3639			300	300	3939
16	GSRTC	7969			7969	120		50	170	8139

Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
17	HRTC	2956		75	3031	28			28	3059
18	J & K SRTC	727		40	767				0	767
19	JCTSL	100			100	100			100	200
20	Kadamba TCL	498		20	518			51	51	569
21	KDMTU	140			140				0	140
22	Kerala SRTC	5327	2	50	5379	122			122	5501
23	KKRTC	4345			4345				0	4345
24	Kohlapur MTU	90			90				0	90
25	KSRTC	8094			8094			50	50	8144

Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
27	Mizoram	29			29				0	29
28	MSRTC	15279	50		15329	309		30	339	15668
29	MTC - Chennai	3436			3436				0	3436
30	Nagaland	177			177				0	177
31	Nagpur	165	72		237	204		86	290	527
32	Nashik CTSL				0	53	197		250	250
33	NBSTC	908			908				0	908
34	NMMT	148	69	30	247	152		150	302	549
35	NWKRTC	4858			4858				0	4858

Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
37	Pepsu	983			983	251			251	1234
38	Puducherry	140			140				0	140
39	PMPML	150	831		981		640	458	1098	2079
40	Rajpath Rajkot				0			50	50	50
41	RSRTC	2971	2		2973				0	2973
42	South Bengal STC	764	60	5	829				0	829
43	SETC, Chennai	1078			1078				0	1078
44	Sholapur	173			173				0	173
45	Sikkim	94			94				0	94

Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
47	ST Punjab	1840			1840				0	1840
48	Salem - TNSTC	2044			2044				0	2044
49	Surat				0			108	108	108
50	TSRTC	6772	132		6904	2950		40	2990	9894
51	Thane MTU	329	35		364			123	123	487
52	Coimbatore - TNSTC	2774			2774				0	2774
53	Kumbakonam - TNSTC	3438			3438				0	3438
54	Madurai - TNSTC	2298			2298				0	2298
55	Tirunalveli - TNSTC	1773			1773				0	1773



Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
57	Tripura RTC	27			27				0	27
58	UPSRTC	7499	400		7899	2378			2378	10277
59	Uttarakhand SRTC	900			900	290	60		350	1250
60	West Bengal TCL				0				0	0
61	Directorate of Urban Transport									
62	Agra-Mathura		70		70			150	150	220
63	Aligarh				0			25	25	25
64	Bareilly				0			25	25	25
65	Ghaziabad TCL				0			50	50	50

Sr.No.	Name of the SRTU	OwnFleet details of SRTUs (Fuel Type-wise)				Hired Buses (Fuel Type-wise)				
		HSD	CNG	E-buses	Total	HSD	CNG	E-buses	Total	
67	Jhansi				0			25	25	25
68	Kanpur		184		184			100	100	284
69	Lucknow		161	40	201			100	100	301
70	Meerut		80		80	8		50	58	138
71	Muradabad				0			25	25	25
72	Prayagraj	119			119			50	50	169
73	Shahjahanpur CTSL				0			25	25	25
74	Varanasi	130			130			50	50	180
<b>Grand Total</b>		<b>116365</b>	<b>7408</b>	<b>283</b>	<b>124056</b>	<b>11261</b>	<b>5740</b>	<b>3702</b>	<b>20703</b>	<b>144759</b>

**Annexure B: On the basis of Grand challenge the initial Allocation of E-Buses tendered**

City	12m Low Floor AC	12m Low Floor Non-AC	12m Standard Floor AC	12m Standard Floor Non- AC	9m Std Floor AC	Total
Delhi	921	-	-	-	-	921
Kolkata	354	-	354	-	472	1180
Bangalore	-	921	-	-	-	921
Hyderabad	-	-	-	300	-	300
Surat	-	-	-	-	150	150
<b>Total</b>	<b>1275</b>	<b>921</b>	<b>354</b>	<b>300</b>	<b>622</b>	<b>3472</b>

**Annexure C: Allocation: Buses tendered without FAME II subsidy**

City	12m Low Floor AC	12m Low Floor Non-AC	12m Standard Floor AC	12m Standard Floor Non- AC	9m Std Floor AC	Total
Delhi	579	-	-	-	-	579
Kolkata	246	-	246	-	328	820

<b>Bangalore</b>	-	579	-	-	-	579
<b>Hyderabad</b>	-	-	-	-	-	0
<b>Surat</b>	-	-	-	-	-	0
<b>Total</b>	<b>925</b>	<b>579</b>	<b>246</b>	<b>0</b>	<b>328</b>	<b>1978</b>

#### **Annexure D: Double Decker buses tendered without FAME II subsidy**

<b>City</b>	<b>9.5m Double Decker</b>	<b>Total</b>
<b>Delhi</b>	100	100
<b>Kolkata</b>	0	0
<b>Bangalore</b>	5	5
<b>Hyderabad</b>	5	5
<b>Surat</b>	25	25
<b>Total</b>	<b>135</b>	<b>135</b>