



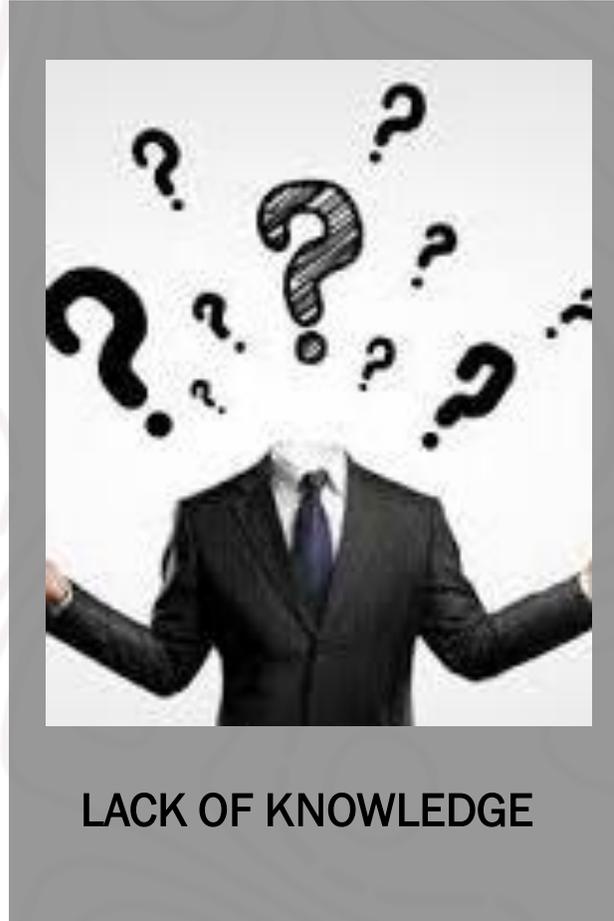
# Barriers to Adopting Electric Buses

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# KEY BARRIERS TO ADOPTING ELECTRIC BUSES

## KEY TECHNOLOGICAL BARRIER



In general, cities lack the information needed to make informed decisions at almost all stages, from establishing an initial discussion to scaling up

Cities lack both general knowledge on the barriers and enablers to implementing their e-bus fleet and city-specific data on the operational viability of their e-buses. Specifically, there is a lack of relevant information and data for cities to determine several key considerations:

- The proper inputs required for an initial cost-benefit analysis of the e-buses and infrastructure
- Strategies and techniques to optimize the design and implementation of an e-bus project
- The operational characteristics, limitations, and maintenance requirements of e-buses available on the market
- Infrastructure planning needs to be completed prior to adoption

# KEY BARRIERS TO ADOPTING ELECTRIC BUSES

## KEY TECHNOLOGICAL BARRIER



TECHNICAL LIMITATIONS OF THE E-BUSES AND CHARGING INFRASTRUCTURE

limitations exist in all three components of the e-bus trade space:

- Vehicles and batteries produce limited range and power relative to conventional buses. The battery manufacturing industry, nascent and immature, faces a learning curve in its effort to produce reliable, road tested products.
- Agencies and operators lack the knowledge needed to adopt new operation models to accommodate for the range and power limitations of e-buses.
- Grid and charging infrastructure are also new and evolving technologies that face limitations and stability challenges.

# KEY BARRIERS TO ADOPTING ELECTRIC BUSES

## KEY FINANCIAL BARRIER



LACK OF LONG-TERM,  
SCALABLE FINANCING  
OPTIONS

Given the risk, uncertainty, and nascency surrounding the e-bus industry, financing is a tremendous barrier that must be overcome if e-buses are to be implemented on a large scale. This is particularly true for municipalities that have not demonstrated strong credit worthiness with past investments. Scaling e-bus projects requires a large, risk tolerant capital investment, both to procure the vehicles and to supply the necessary charging infrastructure and grid upgrades. Often no financial institutions are willing to make this investment, outside of small-scale pilot projects. Thus, the e-bus fleets in many cities are currently operating as non scalable demonstrations.

# KEY BARRIERS TO ADOPTING ELECTRIC BUSES

## KEY FINANCIAL BARRIER



Transit agencies and government institutions typically use rigid financial management models, which incentivize low-cost, low-risk procurement. Most procurement models do not consider the unique cost structure (more expensive up front but cheaper to operate than conventional buses) and uncertain risks inherent in e-buses and their corresponding infrastructure. Traditional procurement practices also do not allocate responsibilities for the new tasks associated with e-bus operations, such as maintaining the batteries and grid infrastructure. Although the total lifetime cost of owning e-buses is often lower than that of conventional buses, and agencies may recognize that a new approach toward procurement is needed, traditional models often prove difficult to change.

# KEY BARRIERS TO ADOPTING ELECTRIC BUSES

## KEY INSTITUTIONAL BARRIER



LACK OF LEADERSHIP AND PRAGMATIC PUBLIC POLICY

One of the most frequently cited institutional barriers was the lack of enabling public policies and/or a specific implementation plan to guide e-bus adoption. In many cities, there are either (1) no laws or roadmaps to provide a strategy plan or financial backing for implementing e-buses, or (2) ineffective plans in place that lack clear goals and financial incentives. One main reason that guidelines and policies are not created and/or implemented is the lack of genuine interest from politicians and key stakeholders. When there are limited incentives and lack luster political support, it can be difficult for some cities to issue appropriate tenders to procure e-buses

# KEY BARRIERS TO ADOPTING ELECTRIC BUSES

## KEY INSTITUTIONAL BARRIER



LACK OF INSTITUTIONAL  
AUTHORITY, FUNDING, AND  
LAND

In many cases, a major barrier to initiating or furthering e-bus projects was the lack of institutional capacity. Some cities lack the resources or jurisdictional authority to coordinate an e-bus project. Informal transit posed a noteworthy barrier for many cities, since the owners and operators of informal transit vehicles are typically not accountable to transit agencies or other government bodies.

The lack of government access to land and property also presented a substantial barrier to upgrading and installing the charging and grid infrastructure that e-bus projects require. Charging infrastructure requires land with permanent space to house it, which is often very difficult to find for transit agencies and municipalities. While property ownership issues are not conventionally thought of as barriers to e-bus adoption, owning and/or having permanent contracts over land to install and manage charging infrastructure is often crucial, especially as e-bus fleets are scaled up.

*Thank You* **TERIMA KASIH**

