

Strategies to Accelerate Electric Mobility

Workshop on Public Transport Governance, Integration, and Paratransit Capacity Building: Lessons From Africa and Latin America

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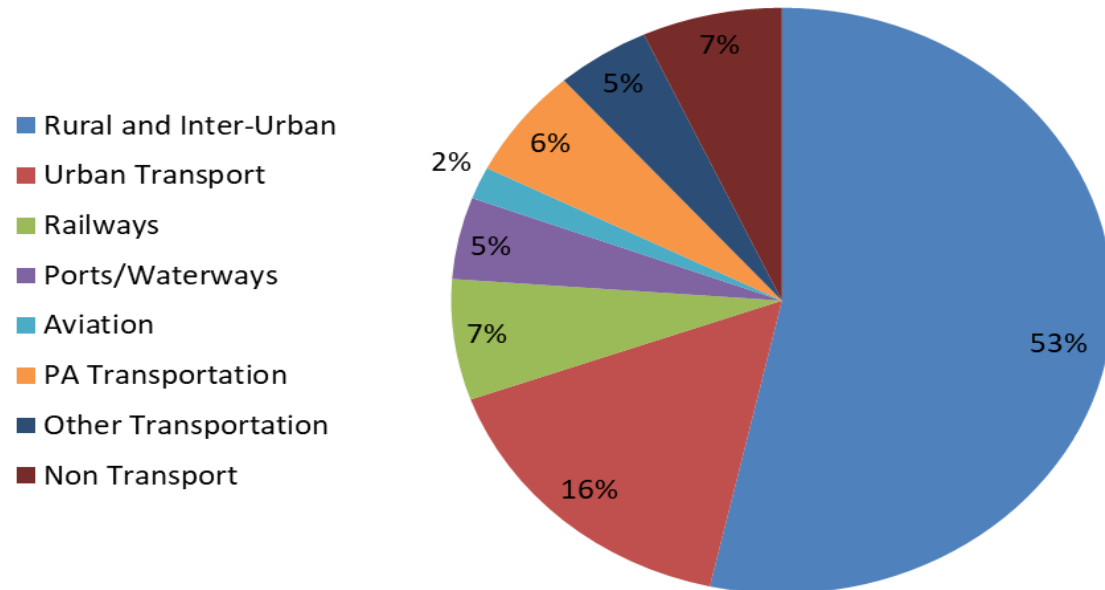


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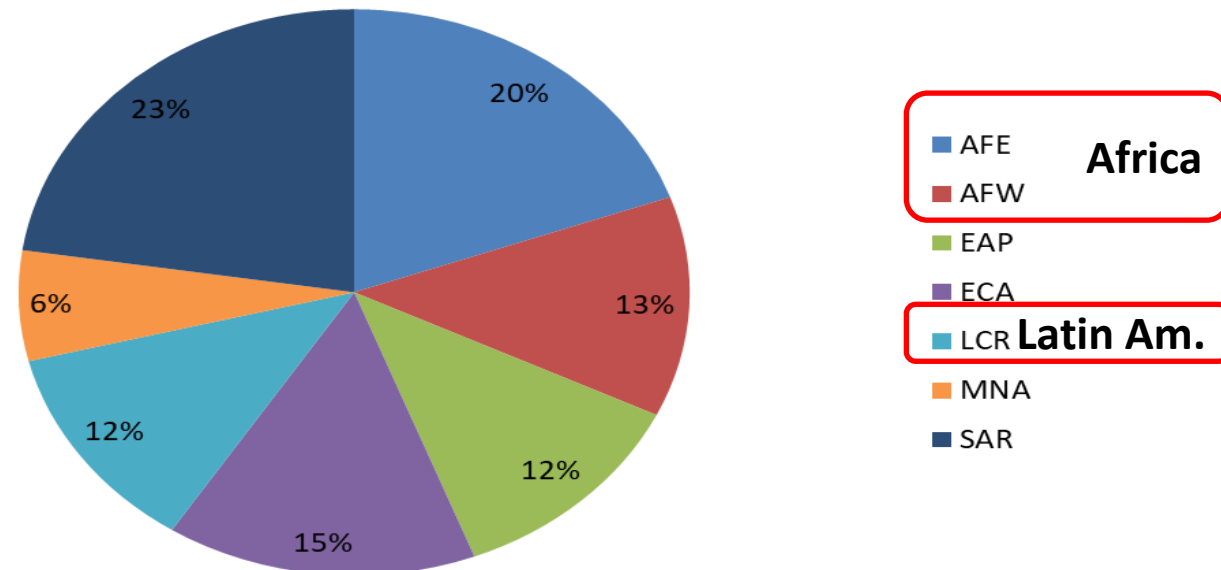


The WB's active transport portfolio has 180 lending projects across 86 countries, and comprises USD \$36bn in commitments

Distribution by Sub-Sector



Distribution by WB Region

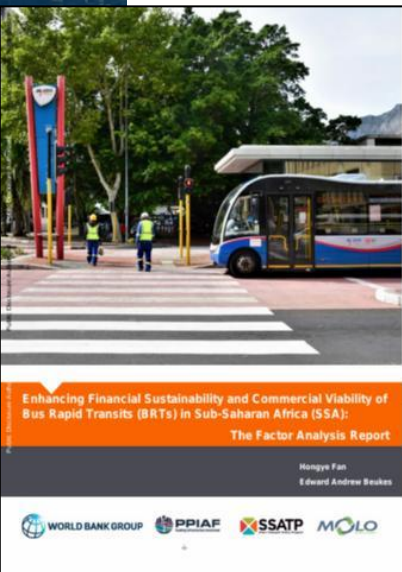
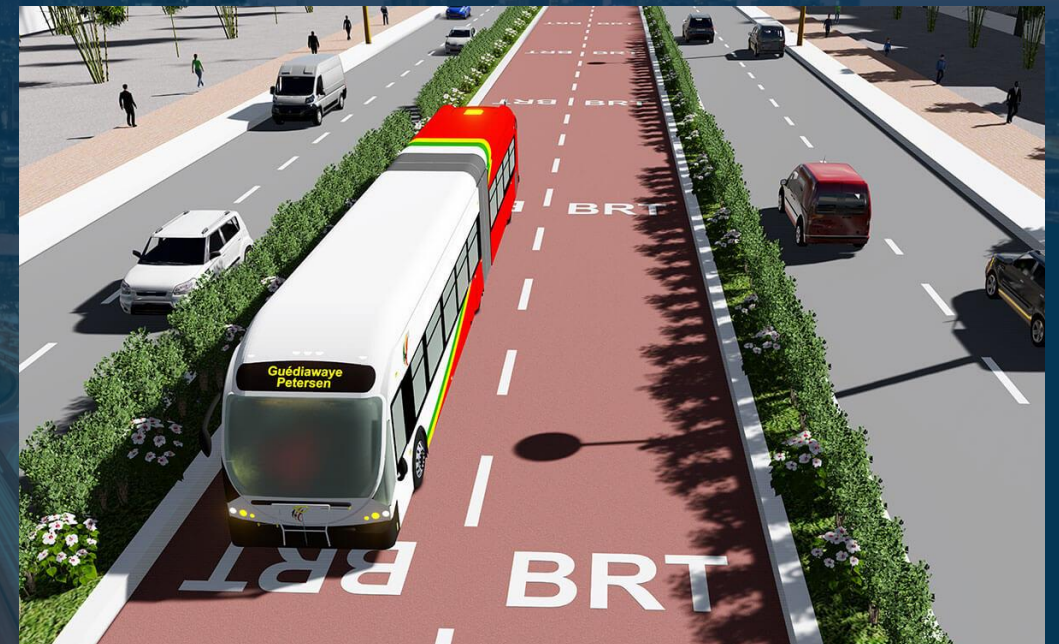


➤ 40+ Bank lending and advisory projects have e-mobility component

World Bank has advised or is engaged in 12+ Bus Rapid Transit Projects in Sub-Saharan Africa

Example: Senegal Dakar Bus Rapid Transit Pilot Project (P156186)

- First 100% electric BRT in Africa
- 20km fully segregated BRT
- Transit time between downtown Dakar and north suburb (Guediawaye) to be reduced from 3 hours to 45 minutes with the BRT and improved road safety.
- Connect 300,000 daily passengers to jobs and services while saving 67,000 tons of CO2 every year.



E-Mobility is increasingly relevant for developing countries.

Once understood as a solution only in major global markets, developing countries have more reasons than ever to care about e-mobility.

- **Why** is electric mobility for passenger transportation relevant to the developing world?
- **When/Where** does it make sense for developing countries to proactively pursue the transition?
- **How** can policymakers accelerate adoption of electric passenger vehicles?

The Economics of Electric Vehicles for Passenger Transportation

Cecilia Briceno-Garmendia, Wenxin Qiao, and Vivien Foster

MOBILITY AND
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Emissions are rising

Emissions from transport are increasing – and faster in developing countries than anywhere else

Improve local air quality

In developing country megacities, EVs can help reduce local air pollution

Last mile connectivity

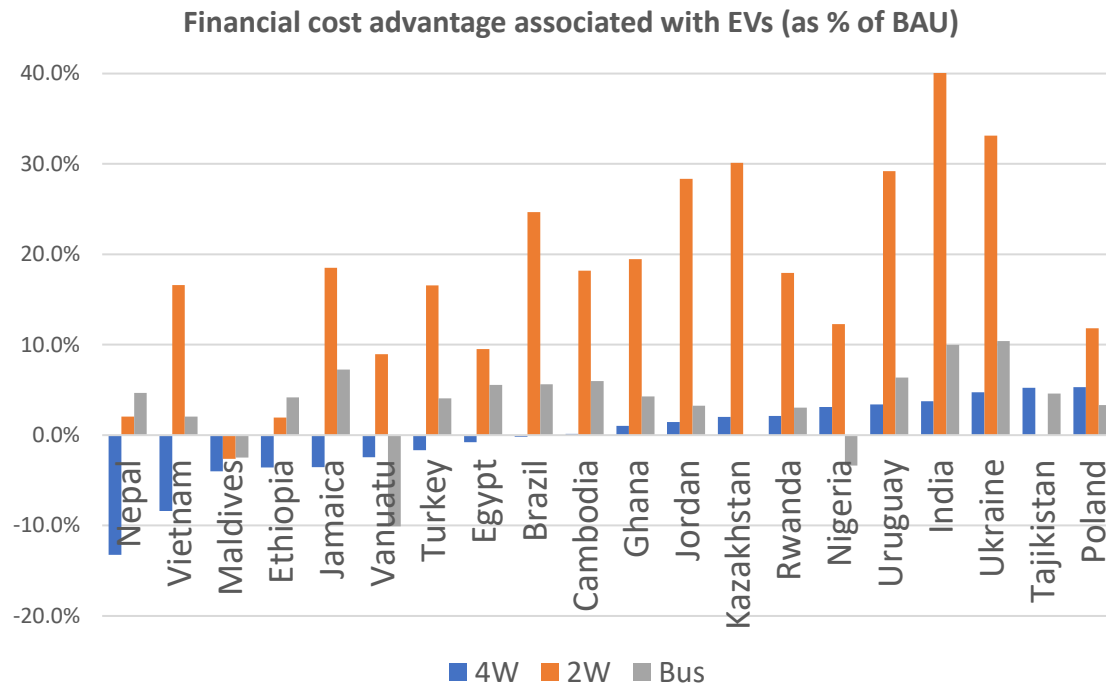
In places where public transport can't yet reach, EVs can be a nimble and affordable option

Supply chain opportunities

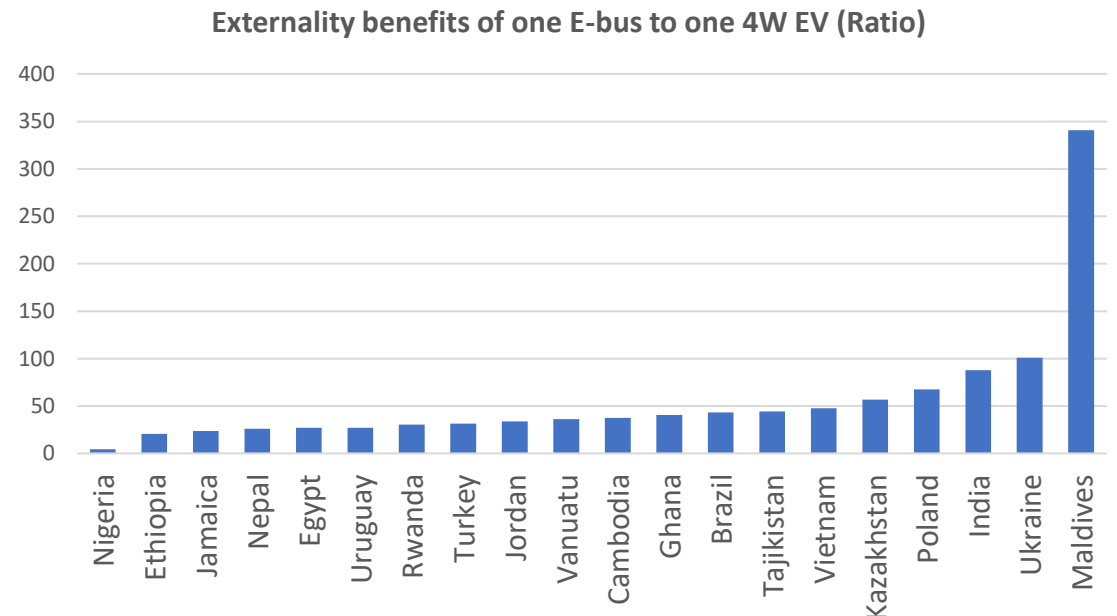
EV production offers new business opportunities and jobs

Question: Should countries prioritize electrification of certain vehicle categories, and if so, which?

Urban buses and 2/3 wheelers are much more promising than Cars in most countries



Electrifying one bus brings externality benefits that are 30x higher than electrifying one Car



Sources: World Bank, “The Economics of Electric Vehicles for Passenger Transportation” and “Electric Mobility Scoping Tool” (2022)

<https://www.worldbank.org/en/topic/transport/publication/the-economics-of-e-mobility-for-passenger-transportation>

Electric two- and three-wheelers

Affordable and build on preexisting habits



The Economics of
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There are two feasible e-mobility entry points for developing countries

Electric Buses

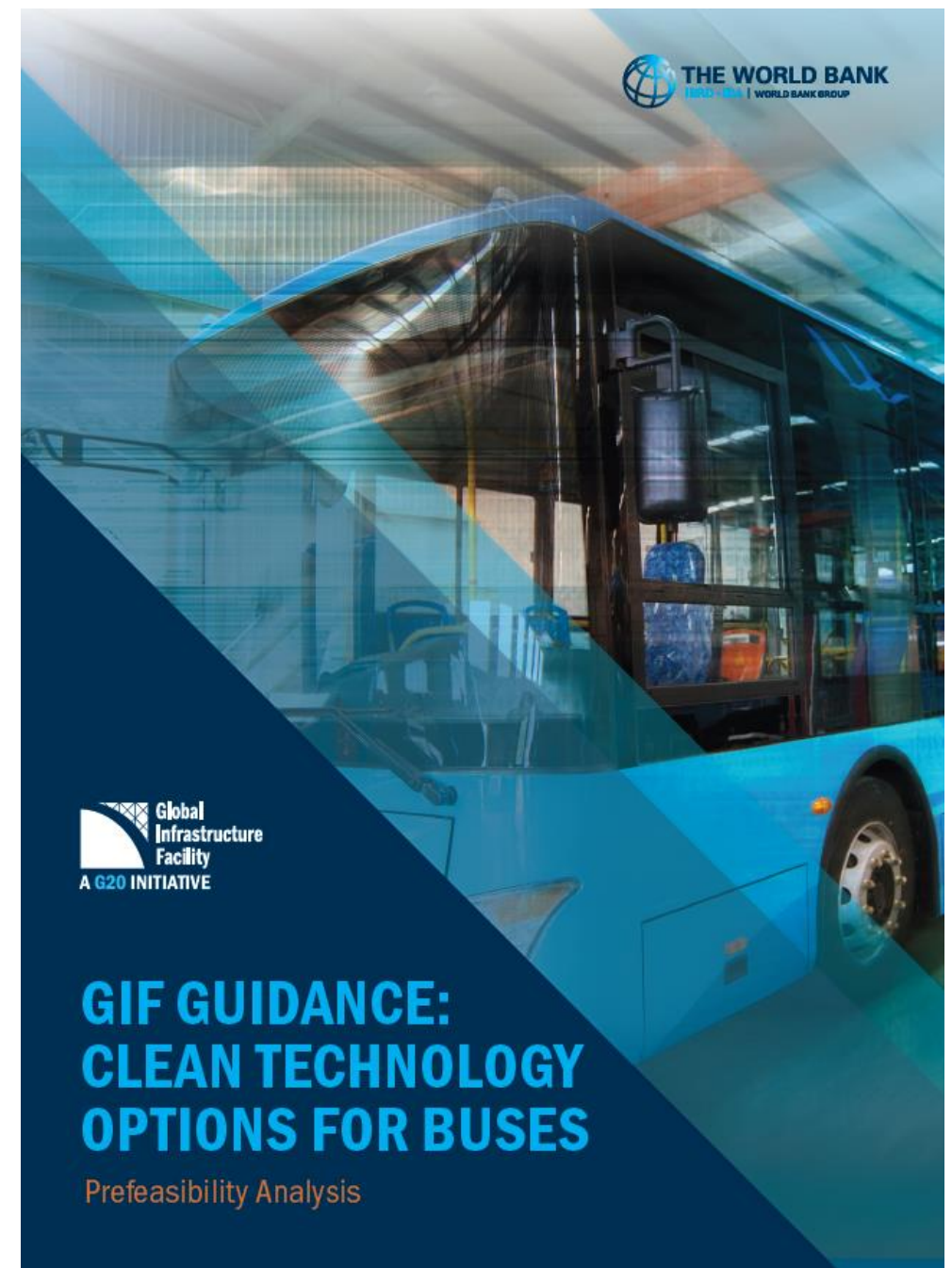
Long mileage; high occupancy

Pre-Feasibility Analysis of Clean Bus Technologies

- Diesel Euro VI buses;
- Biodiesel Euro VI buses;
- Natural gas Euro VI buses (CNG and LNG);
- Hybrid diesel Euro VI buses;
- Fully electric buses (fast charge and slow charge); and
- Hydrogen fuel cell buses.

World Bank-GIF Guidance (2022) “Clean Technology Options for Buses – Prefeasibility Analysis”

<https://elibrary.worldbank.org/doi/abs/10.1596/38382>



Comparing Total Cost of Ownership (TCO) for Clean Bus Technologies

Figure 2.2: World Bank TCO Mexico City estimates (\$/km)

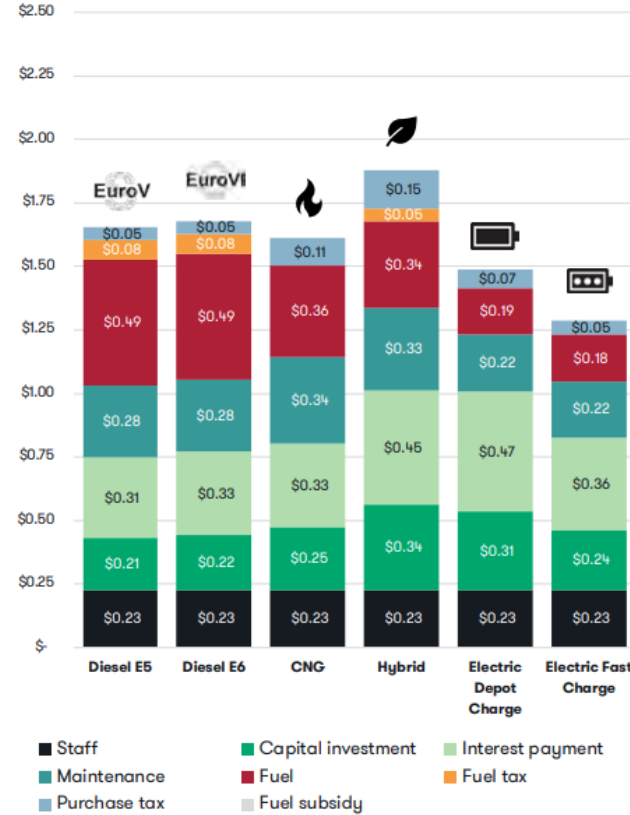


Figure 2.1: World Bank TCO Buenos Aires estimates (\$/km)

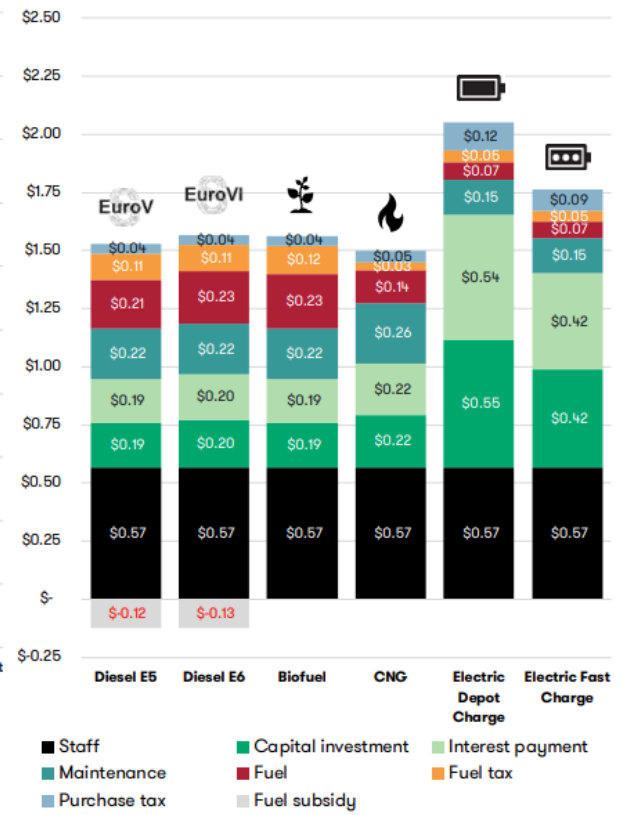


Figure 2.4: World Bank TCO São Paulo estimates (\$/km)

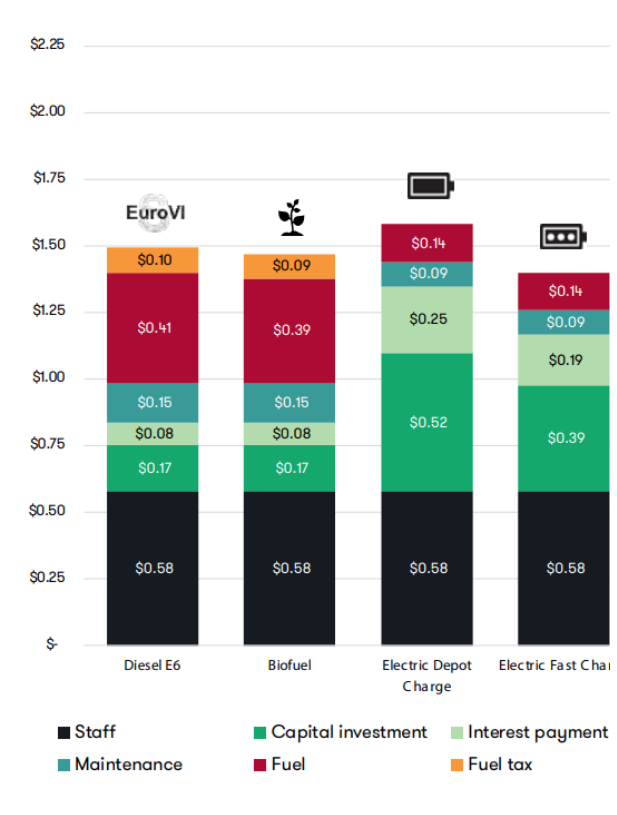
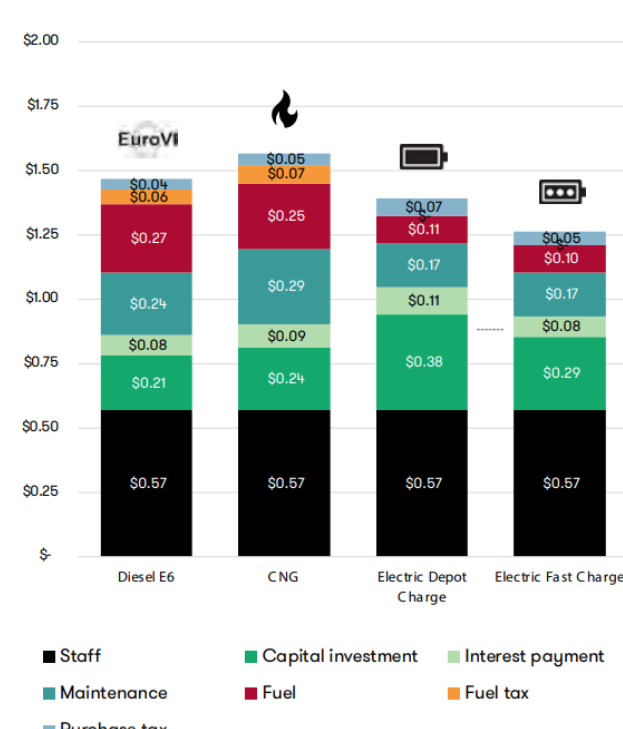


Figure 2.5: World Bank TCO Santiago estimates (\$/km)

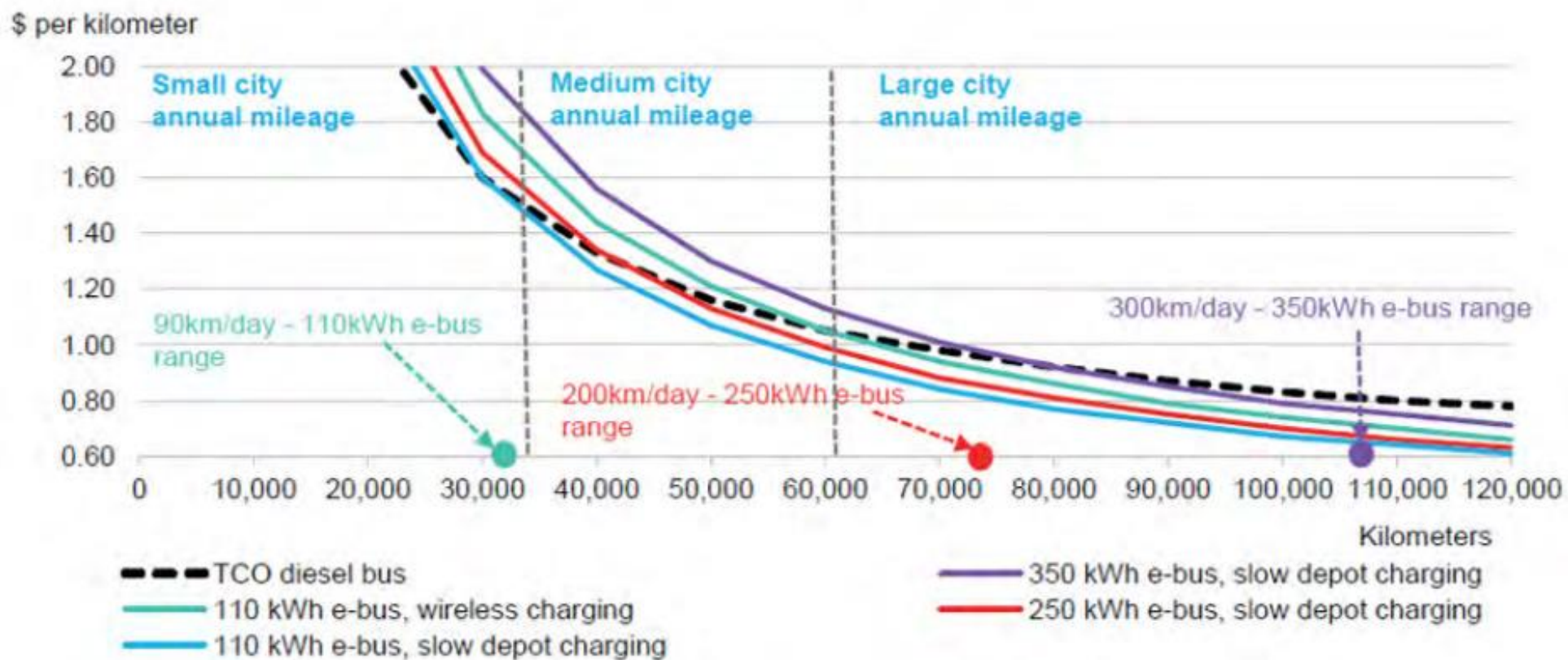


Source: World Bank (2019) [“Green Your Bus Ride: Summary Report of Clean Bus Technologies in Latin America”](#)

Key considerations in financing electric buses

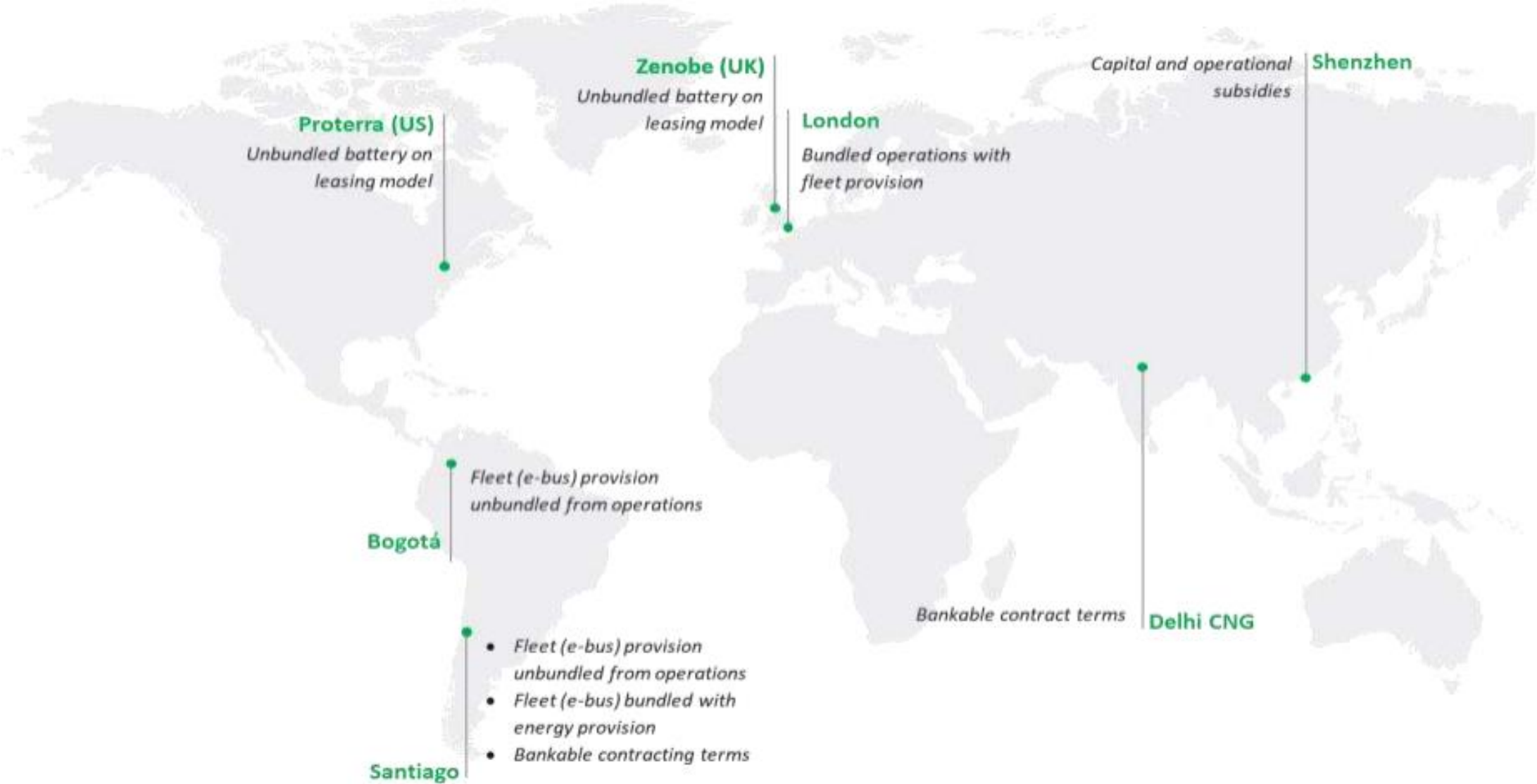
- 1. Upfront Costs:** Although becoming more competitive, e-bus CAPEX is still greater than conventional buses.
- 2. Operating Costs:** E-buses typically have lower OPEX due to lower fuel and maintenance expenses but depends on operational factors (see next slide). Consider how to finance the long-term savings by transitioning to electric buses.
- 3. Infrastructure:** Electric buses require charging infrastructure, which may not be readily available in some countries, and may need upgrades to the electrical grid.
- 4. Local Manufacturing and Capacity Building:** Can create jobs in new industries but can also impact existing jobs and create a need to re-training bus drivers, mechanics and other staff to ensure the successful adoption of electric buses.
- 5. Regulatory Environment:** Governments can create incentives for e-bus adoption, such as tax credits or subsidies, and establish regulations that require bus fleets to transition to electric over time.
- 6. Financing Mechanisms:** If traditional methods (bank loans or bond issuances) are limited, may want to consider public-private partnerships (PPP), blended public-private finance, and different e-bus provision models (See next slides).

Figure 2.2: Total cost of bus ownership comparison with different annual distance driven.



Source: Bloomberg New Energy Finance, AFLEET, Advanced Clean Transit Notes: Diesel price at \$0.66/litre (\$2.5/gallon). Electricity price at \$0.10 kWh, annual km. traveled - variable. Bus route length will not always correspond.

Case Studies on E-Bus Financing/Provision Models



World Bank (2022) [“IMPROVING BANKABILITY OF E -BUS PROCUREMENT IN INDIA”](#)

Conclusions (1): How can policymakers accelerate adoption of electric passenger vehicles?

1) Strategic Recommendations:

- Position e-mobility within an integrated national strategy for sustainable mobility
- Evaluate the economic case for and timing of electric mobility at the country level, e.g. using the WB Electric Mobility Scoping Tool

2) Transport Sector Recommendations:

- Target adoption of electric mobility towards most promising vehicle segments
- Prioritize use of public funds for subsidization of charging infrastructure
- Facilitate recycling of batteries and swapping for electric vehicles
- Adopt demand pooling mechanisms in procurement for buses



Economics of Electric Vehicles for Passenger Transportation, World Bank (2022):
<https://openknowledge.worldbank.org/handle/10986/38265>

Conclusions (2): How can policymakers accelerate adoption of electric passenger vehicles?

3) Energy Sector Recommendations:

- Integrate demand for electric mobility into power sector planning
- Adopt electricity demand management measures to shift charging demand away from peak periods
- Reform electricity tariff structures to provide incentives for more efficient charging behavior
- Reform energy prices with suitable incentives for EV adoption

4) Finance Recommendations:

- Aggregate demand and enlarge markets, e.g. regional facility and creation of financing mechanisms to spread higher capital costs
- Tap into carbon finance to offset public investment needs
- Examine fiscal implications of e-mobility and adjust taxation



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