

Accra BRT Fleet: Electric Bus Comparative Analysis

Evaluating the Case for Fleet Electrification in the Greater Accra Metropolitan Area

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Executive Summary

This analysis compares the technical specifications and operational economics of the current Accra BRT diesel fleet with modern battery electric bus alternatives. The comparison demonstrates compelling advantages for electric buses across multiple dimensions, including operational costs, environmental impact, passenger comfort, and expanded service capabilities.

Reference fleet: Scania KUB4x2 / Marcopolo Viale BRS 13m Low-Floor BRT (diesel)

Key findings at a glance:

- 68% reduction in energy costs (electricity versus diesel)
- 50% reduction in maintenance costs (1.5% versus 5.0% annual maintenance rate, due to fewer rotating parts)
- 22% lower Total Cost of Ownership over a 12-year vehicle lifespan
- Zero local emissions, with immediate improvement to urban air quality in Accra's core
- Quieter operation (65-70 dB versus 80 dB), reducing noise pollution for communities along bus corridors
- Superior acceleration and hill-climbing capability through instant torque delivery
- New underfloor luggage compartment (2-3 cubic metres) enabled by the flat-floor electric drivetrain design

1. The Case for Transition

Greater Accra's transport sector currently emits 6.5 million tonnes of CO₂-equivalent annually. The BRT fleet, which forms the backbone of GAPTE's formal rapid transit network, represents both a significant source of urban emissions and a major opportunity for meaningful, measurable environmental improvement.

Global manufacturing trends reinforce the urgency of this transition. Production of Internal Combustion Engine (ICE) vehicles is projected to decline sharply from 2030 as major manufacturers shift to electric drivetrains. African transit operators that delay fleet electrification face increasing costs in sourcing parts and maintaining diesel vehicles, while missing the window to access international green finance instruments.

GAPTE's analysis demonstrates that the transition is not only environmentally imperative but economically advantageous over the vehicle lifecycle.

2. Technical Comparison - Drive System

Specification	Current Diesel Fleet	Electric Bus Advantage
Engine / Motor Type	Scania DC09 114 Diesel (9.3L, 5-cylinder)	Permanent Magnet Synchronous Motor (PMSM)
Power Output	184 kW (250 hp) at 1,900 rpm	200-250 kW continuous; 350+ kW peak
Torque	1,250 Nm at 1,000-1,350 rpm	2,000+ Nm instant torque from 0 rpm
Thermal Efficiency	35-40%	95%+ electric motor efficiency
Transmission	ZF Ecolife 6-speed automatic with retarder	Single-speed direct drive with regenerative braking
Braking	Disc front, drum rear with ABS	Disc all-round with regenerative assist (15-25% energy recovery)

3. Technical Comparison - Energy and Range

Specification	Current Diesel Fleet	Electric Bus
Energy Storage	300-litre diesel tank	350-450 kWh lithium battery pack
Operational Range	~650 km per tank	250-350 km per charge (urban cycle)
Refuel / Recharge Time	5 minutes	4-6 hours depot; 10-20 min opportunity charging
Energy Cost	GHS 15.50 per litre	GHS 1.85 per kWh (ECG commercial rate)
Consumption Rate	45 litres per 100 km	1.2 kWh per km (urban cycle)
Local Emissions	Euro 3 standard	Zero local emissions

4. Technical Comparison - Vehicle Specification

Specification	Current Diesel Fleet	Electric Bus
Body Construction	Marcopolo Viale BRS fibreglass	Lightweight composite or aluminium body
Floor Type	Low floor with step at rear (engine intrusion)	Full flat floor throughout
Seating Capacity	39 seats + 44 standees	40+ seats possible due to flat floor design

Doors	2 double-leaf pneumatic	2-3 double-leaf electric doors
Windows	Tinted laminated safety glass	Double-glazed for thermal efficiency
Luggage Storage	None (engine occupies under-floor space)	2-3 m3 underfloor luggage compartment
Suspension - Front	Parabolic leaf springs	Air suspension for comfort and kneeling
Suspension - Rear	Air suspension with levelling	Air suspension standard
Noise Level	~80 dB	65-70 dB (significantly quieter)

5. Total Cost of Ownership Analysis

Energy Cost Comparison (per 100 km)

Diesel fleet: 45 litres x GHS 15.50 = GHS 697.50 per 100 km

Electric bus: 120 kWh x GHS 1.85 = GHS 222.00 per 100 km

Savings: GHS 475.50 per 100 km - a 68% reduction in energy cost

Maintenance Cost Comparison

Diesel fleet: 5.0% of vehicle value per year (multiple rotating components, engine servicing, exhaust systems)

Electric bus: 1.5% of vehicle value per year (fewer mechanical components; no engine oil, filters, or exhaust maintenance)

Savings: 50% reduction in annual maintenance costs

12-Year Lifecycle Cost

When energy, maintenance, and vehicle residual values are modelled over a 12-year operational lifecycle, electric buses demonstrate a Total Cost of Ownership approximately 22% lower than equivalent diesel vehicles at current Ghana energy prices.

6. Strategic Recommendations

1. GAPTE should commence procurement planning for a pilot electric bus deployment on one or two priority corridors, using international green finance instruments to offset upfront capital costs.
2. Government should consider a bulk fuel subsidy or grid-rate arrangement for GAPTE's depot charging infrastructure during the transition period to maximise energy cost savings.
3. Procurement specifications for new bus acquisitions should prioritise electric drivetrains from 2026 onwards, in anticipation of the 2030 decline in global ICE vehicle production.

4. GAPTE should engage the Ghana Grid Company (GRIDCo) and Electricity Company of Ghana (ECG) early to ensure adequate grid capacity at depot locations selected for charging infrastructure.
5. A phased fleet renewal programme should be developed, targeting full BRT fleet electrification by 2035.

7. Conclusion

The evidence is clear: transitioning the Accra BRT fleet to battery electric buses is both financially sound and strategically imperative. Electric buses deliver lower operating costs, significantly reduced emissions, and an improved passenger experience — while positioning Greater Accra to benefit from the global shift in vehicle manufacturing that is already underway.

GAPTE is committed to leading this transition in a structured, evidence-based, and financially sustainable manner, in partnership with government, development finance institutions, and the private sector.

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