WWF

SOUTH AFRICA

GETTING ON BOARD WITH E-BUSES

EMERGING CLIMATE-SMART BUSINESS OPPORTUNITIES

Author
Kate Rivett-Carnac

Materials development to create this publication:
Barbara Hutton, Louise Naudé (2025)

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Text editor
Barbara Hutton

Design and layout
Farm Design, www.farmdesign.co.za

Photos
Elsabe Gelderblom

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For more information, contact:
Louise Naude, WWF-SA
Email: lnaude@wwf.org.za
or info@wwf.org.za

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A SNAPSHOT OF THE OPPORTUNITY

Battery electric buses (e-buses) provide a rapid pathway to decarbonising public road transport, reducing operating costs and producing zero air pollutants.

Apart from supporting South Africa's climate ambitions and commitments, localising e-bus manufacturing offers a strategic opportunity to strengthen the country's low-carbon industry, create jobs, build local capabilities and position South Africa as a key player in the regional New Energy Vehicles (NEV) export market.

The case for investment

Cost savings: Replacing South Africa's total bus parc of 25 000 with battery-electric buses (e-buses) could lead to equivalent total cost of ownership and significant reductions in operating costs, over 15 years.

Good operational fit: E-buses are well-suited for public transport, with predefined routes, predictable loads, and mid- or end-shift charging.

Localisation potential: Existing minerals, materials and capabilities enable greater localisation and lower costs. The established automative industry is in place to support the development of local e-bus and componentry part manufacturing.

Growing demand: E-buses lead global and African zero-emission adoption. Capitalising on SADC trade agreements can boost exports.

The market

Bus industry size: South Africa's bus parc (registered buses) consists of approximately 25 000 buses, with 19 000 used for public passenger transport. Thirty per cent of these receive a Public Transport Operator's Grant, while 16% are either unfunded or rely on municipal or provincial funding.

Replacement demand: At least 12 000 aging buses need replacement within 3–5 years, yielding a potential demand of 3 000 buses annually for at least 4 years.

Policy support: Government investment, infrastructure support and incentives aim to lower the cost of production and stimulate demand.

Export potential: In 2022, buses and medium/heavy commercial vehicles made up 0.3% of South Africa's vehicle exports but are a possible important future market.

Socio-economic benefits

Public health: In 2015, transportation was responsible for 7% of deaths from air pollution; with 48% linked to on-road diesel vehicles. E-buses can significantly reduce this health burden.

Job creation: Local e-bus manufacturing and servicing could create jobs and local capabilities in this important emerging low-carbon industry segment.

Climate change benefit

High transport emissions: In 2022, road transport accounted for 97% (51.2 Mt CO_2e) of South Africa's transport greenhouse gas emissions. This is from combustion of fuels in vehicles, it does not include the additional emissions from producing the fuels.

E-bus impact: Replacing the 25 000-bus parc could save 2,5 million tonnes of greenhouse gases (GHG) and improve air quality by reducing pollutants by 48 million kg.

SIZE OF THE OPPORTUNITY

What's happening globally?

In the International Energy Agency's (IEA)[1] 2030 Net Zero scenario, 25% of buses in operation (total stock) will be Zero Emission (ZE) buses (4,2 million, based on the size of bus parc in 2021). To achieve this transition, global bus emissions must be reduced by 16% by 2030 compared to current levels.

SIZE OF THE GLOBAL E-BUS MARKET (2022)

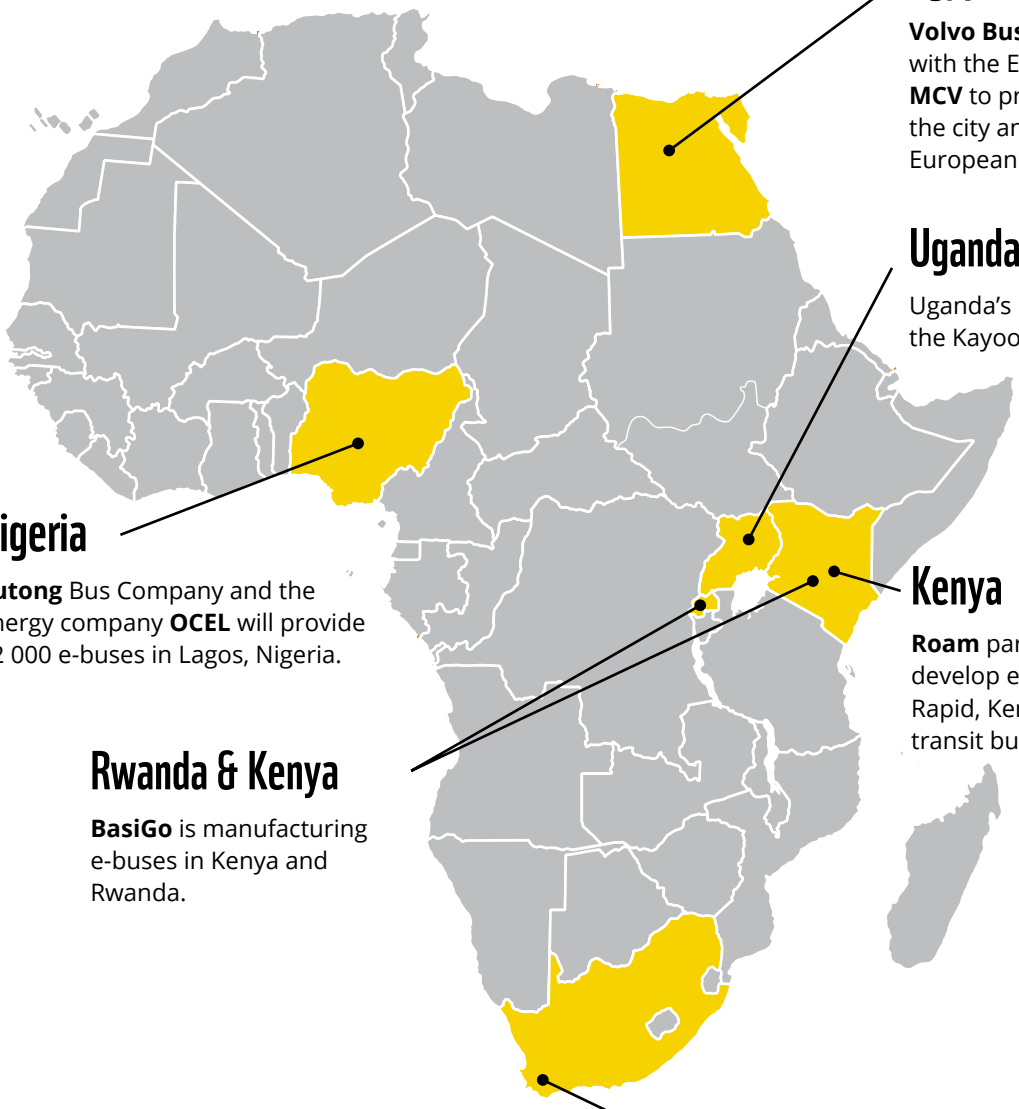
730 000
TOTAL ZE BUS MARKET

In 2022, there were approximately 730 000 ZE buses worldwide. Over 63 000 battery electric vehicles (BEVs) and 2 400 plug-in hybrid electric vehicles (PHEV) were sold, accounting for 4.5% of total bus sales.[2]

E-buses show the largest growth and adoption worldwide, with China accounting for over 80% of sales. However, sales in Europe and the United States also increased.

The global e-bus market is likely to grow at a Compound Annual Growth Rate (CAGR) of 13.6% from 2023 to 2027. While most bus models are manufactured in China, the country has fewer original equipment manufacturers (OEMs) than the United States and Canada.

Signals from the African e-bus market



Egypt

Volvo Buses signed a letter of intent with the Egyptian body bus builder **MCV** to produce e-bus bodies for the city and intercity segments in European markets.

Uganda

Uganda's **Kiira Motors** launched the Kayoola Solar Bus.

Nigeria

Yutong Bus Company and the energy company **OCEL** will provide 12 000 e-buses in Lagos, Nigeria.

Kenya

Roam partnered with **Hitachi** to develop e-buses in Kenya. The Roam Rapid, Kenya's first electric mass transit bus, is already in operation.

Rwanda & Kenya

BasiGo is manufacturing e-buses in Kenya and Rwanda.

Cape Town

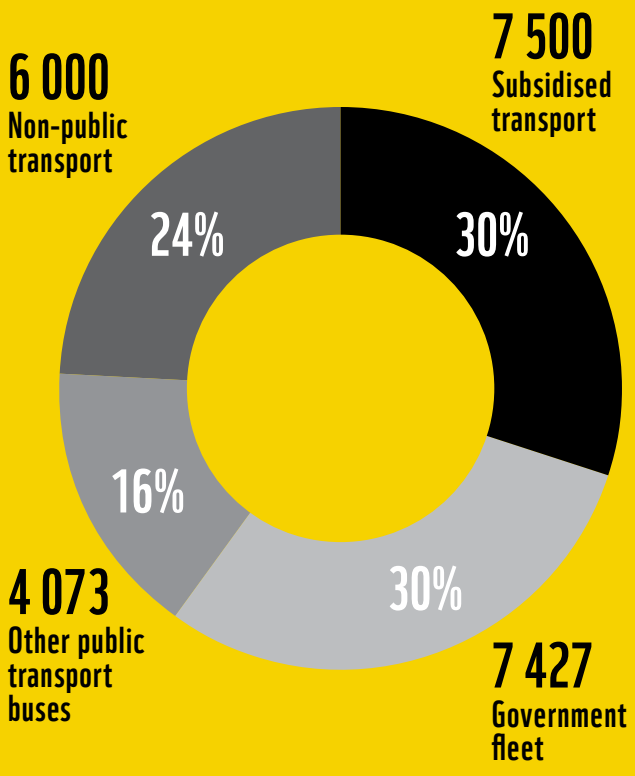
In Cape Town, **BYD** and **Golden Arrow Bus Services (GABS)** conducted tests on two 37-seater BYD e-buses. A 65-seater GABS-spec e-bus was also tested. Data indicates a 74% savings on energy costs and a 50% savings on spare parts. Several additional costs and challenges were noted, such as 50% taxes and duties of the landed costs.[3]

South African bus market

South Africa has approximately **25 000 buses** in total. Of these:

- **19 000** buses are used for public transport, while **6 000** are used in private (corporate) and government institutions for staff transport.
- **7 500** (30%) receive government subsidies through the Public Transport Operators' Grant (PTOG) to the value of ZAR 6 billion (2019/20), which mainly supports the largest bus companies. This subsidy funds interim contracts (last concluded in 1997); tendered contracts (last concluded in 2001); and negotiated contracts.
- **7 427** (30%) buses account for the government fleet; while the remaining **4 073** (16%) are likely owned by smaller bus companies, which may be unfunded or rely on municipal and provincial subsidies.

MAKE UP OF 25 000 SOUTH AFRICAN BUS PARC (ESTIMATED)



The transition to a low-carbon transport sector requires a shift from private to public transport, and were this to be achieved, the domestic bus parc could grow significantly.

Main bus commuter operators in South Africa[4]

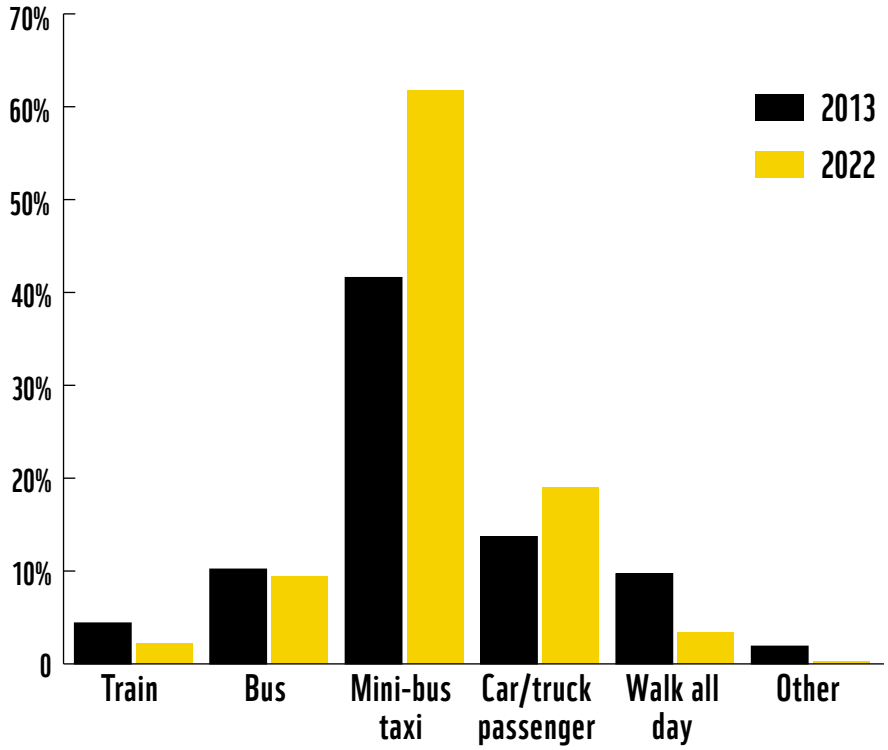
- **Public Utility Transport Corporation (PUTCO)** is the largest bus operator with about 1 307 buses, servicing mainly Gauteng and Mpumalanga (Kwa Mhlanga).
- **Golden Arrow Bus Services (GABS)** is the second largest bus operator with about 1 100 buses, servicing the Western Cape.
- **North West Star SOC Ltd** operates in Gauteng and North West.
- **Algoa Bus Company (Pty) Ltd** operates in Nelson Mandela Bay.
- **Great North Transport SOC Ltd** operates in Limpopo.
- **Buscor (Pty) Ltd** operates in Mpumalanga.
- **Interstate Bus Lines (Pty) Ltd** operates in Free State.
- **Metro Group of Companies (Pty) Ltd** operate in eThekwini and Zululand.

Source: Competition Commission South Africa, 2021. *Market Inquiry, Land based public transport sector;* SABOA, 2023. *Green Procurement Guidelines*, DoT.

Passenger bus use

In 2020, only 9.4% of households relied on buses as their main mode of travel, down from 10.2% in 2013. Bus use was higher in rural areas (21.2%) than in urban areas (at 8.3%). However, expectations are that the demand for commuter bus transport will increase due to the high fuel price.[5]

MAIN MODES OF PASSENGER TRAVEL, 2013 AND 2020



Source: Statistics South Africa, *National Household Travel Survey*, 2020.

Bus sales – domestic and exports

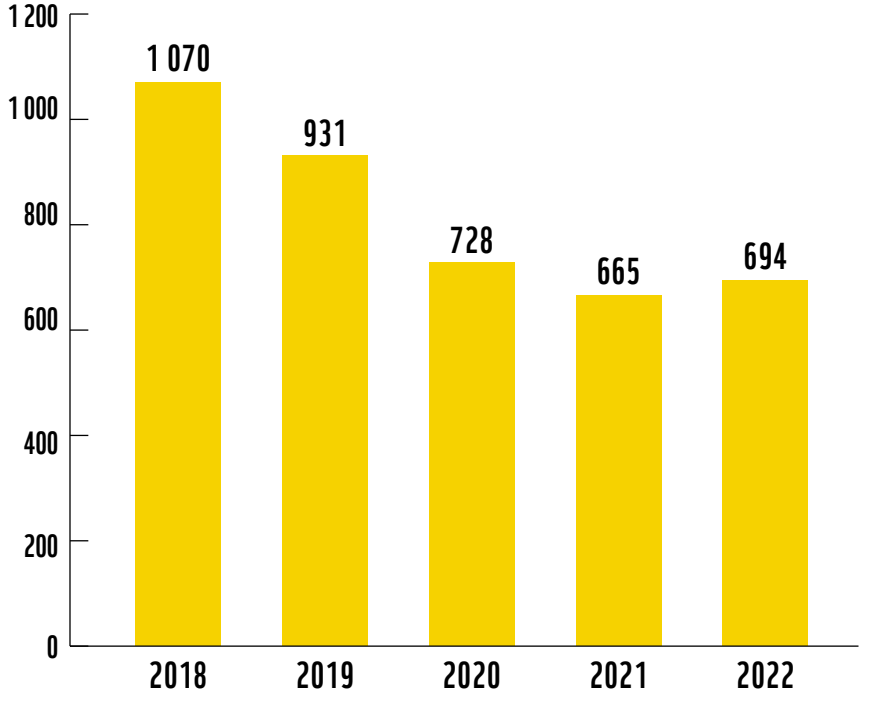
Domestic bus sales declined from 1 070 in 2018 to 694 in 2022. It is likely that COVID-19 impacted these sales, as well as a lack of clarity on the subsidy policy for bus operators.

The low sales indicate that replacement rates in the overall bus parc have slowed, even though about 12 000 (half the fleet) are 10 years or older.

The outlook for the growth of the overall bus parc is unclear and depends on whether commuters will shift back from mini-bus taxis. Commuters make choices based on price, as well as convenience (frequency, reliability, safety and routes).

Exports of medium and heavy commercial vehicles and buses were only 0.3% of total vehicle exports in 2022, mainly going to Zimbabwe and Zambia. However, vehicle exports could become an important future

ANNUAL BUS SALES IN SOUTH AFRICA, 2018–2022



Source: NAAMSA, 2023. *Automotive Export Manual*.

FINANCIAL PERFORMANCE OF THE BUS INDUSTRY

"The allocation of bus subsidies does not adequately consider challenges and costs incurred by bus operators ..." (The Competition Commission, *Market Enquiry into the Land Based Public Transport Sector*, Main Report, p. 12).

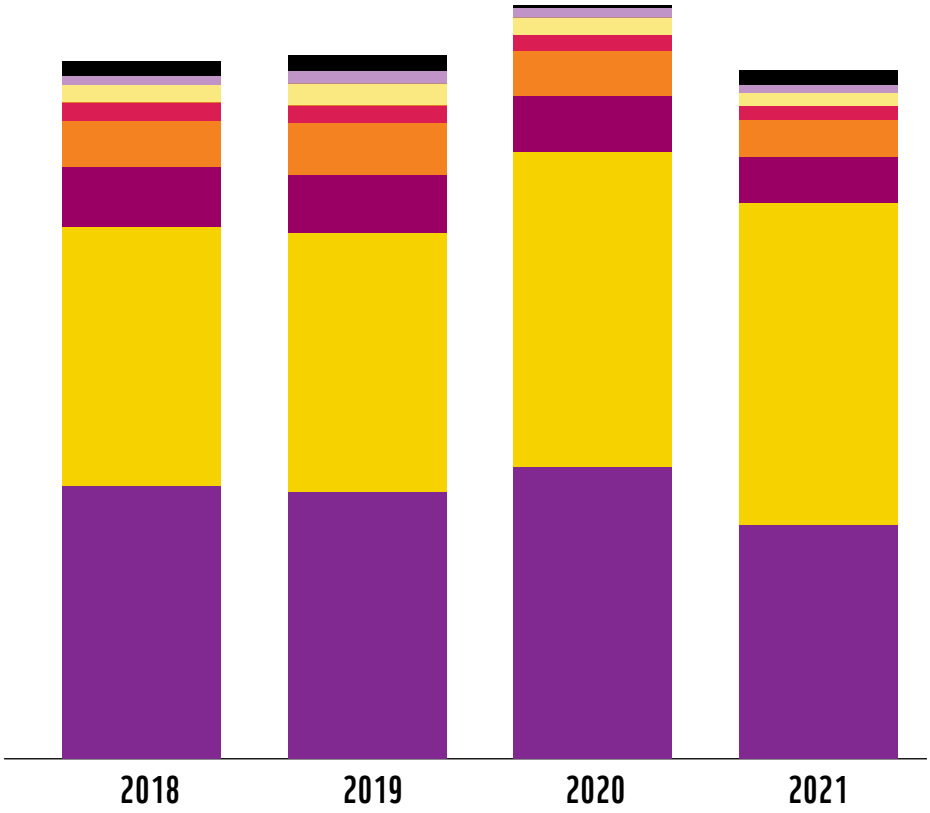
Bus companies are struggling to operate profitably:

- **The PTOG is a supplementary grant:** Provinces are expected to 'top up' the subsidy to align with the relevant escalation formulas in existing contracts. This has only happened in three provinces. In 2022, the PTOG de-escalated by 0.4%.
- **Capped annual kilometres of operators:** Contract costs may not exceed the allocated amount in the PTOG.
- **Rising costs:** All contracts are net-cost (operators bear all costs and revenue risks), inflation exceeds annual increases, and the PTOG lags behind relevant escalation formulae.
- **ZAR 3,6 billion deficit:** The PTOG falls short compared to expected subsidy increases, using the interim contract escalation formula as a proxy for the other contracts.[6]
- **Passenger fare contribution:** In 2019/20, the average subsidy per passenger was ZAR 22/km and revenue was ZAR 26/km. This represents 270 million subsidised trips for the period.
- **Cash flow constraints:** 85% of industry expenses go to employment, motor vehicle running, insurance, maintenance, operational purchases, interest, rent, utilities and depreciation.

Trends in cost categories indicate that for the industry as a whole:[7]

- **Employment costs:** Declined from 33% in 2018 to 30% in 2021, with real costs falling from ZAR 3,8 billion (2020) to ZAR 3 billion (2021). In 2019/20, the industry employed an average of 2.1 people per bus.
- **Aging fleet and low insurance costs:** Relative low insurance costs suggest that the value of the bus parc is declining, linked to aging fleets. This is reflected in the industry's total asset value, which decreased from ZAR 6,3 billion (2020) to ZAR 5,6 billion (2021).
- **Recovery in operating costs:** Motor vehicle running costs rebounded in 2021, implying that buses were once again operational as COVID-19 restrictions were relaxed.

MAIN EXPENDITURE CATEGORIES AND VALUES, SCHEDULE LAND TRANSPORT INDUSTRY (NON-RAIL), 2018–2021



Totals for scheduled land transport in ZAR millions

	2018	2019	2020	2021
Motor vehicle running expenses	185	200	29	194
Insurance	124	167	133	110
Interest	232	289	229	169
Rental: land, buildings	237	229	206	183
Repair and maintenance	591	679	591	474
Depreciation	796	750	728	613
Purchases	3,392	3,403	4,139	4,218
Employment cost	3,576	3,494	3,819	3,063

Source: Author, based on Statistics South Africa, Annual Financial Statistics Surveys: 2018, 2019, 2020 and 2021.

ENABLING POLICY ENVIRONMENT

A number of policy pieces recommend an overhaul of public transport contracts and funding, and support the adoption of electric vehicles.

Select legislation and plans with direct relevance to e-bus adoption

SA policies, legislation, government programmes	Relevance to EVs and e-bus adoption
Department of Transport's Green Transport Strategy (2016) https://www.changing-transport.org/wp-content/uploads/I_K_Green-Transport-Strategy_South-Africa_2018_EN.pdf	Proposes that to support a transition to EVs: Government will provide manufacturing incentives, including support for R&D in batteries; develop supportive procurement policies; consider conversion; introduce incentives for the beneficiation of local resources for manufacturing; and support local EV OEMs. A revision of the Green Transport Strategy is underway.
Department of Trade, Industry and Competition's Automotive Masterplan 2035 https://www.thedtic.gov.za/wp-content/uploads/Masterplan-Automotive_Industry.pdf	Proposes to increase production incentives benefit – relevant to buses – by 25% on components (from 10% to 12.5% of value addition). The Automotive Incentive Scheme applies to trucks and buses (grant related to investment), which are not eligible for the Automotive Production and Development Programme, phase 2.
Department of Trade, Industry and Competition's Electric Vehicles White Paper (2023) https://www.thedtic.gov.za/wp-content/uploads/EV-White-Paper.pdf	Identifies 10 policy goals and sets 16 policy actions to be implemented over specific timelines between 2023 and 2035. Ten of these actions support the development of cost-competitive EV manufacturing in South Africa; and six actions support the development of a local market for EVs. The Paper focuses on the fiscal and regulatory environment; the development of new manufacturing plants; investment in componentry; reskilling and upskilling staff; sustainable manufacturing; and R&D.
Support Programme for Electric Vehicles (February 2024 notice under the Automotive Investment Scheme) https://www.thedtic.gov.za/wp-content/uploads/Automotive-Suppport-Programme-for-EV-Notice.pdf	Provides: • A reimbursable cash grant of 20% of the value of investment in EV productive assets by OEMs • An accelerated depreciation allowance of 150% for such assets • A reimbursable cash grant of 35% of the value of investment in productive assets by component manufacturers, tooling manufacturers and battery assemblers.
Department of Transport: Green Procurement Guidelines (final draft) (2023)	Provides options on how to procure Energy Efficient Vehicles; and provides guidelines on a green vehicle procurement tender, suggests environmental criteria, and further aspects/criteria that should be considered.

SA policies, legislation, government programmes	Relevance to EVs and e-bus adoption
National Public Transport Subsidy Policy (draft dated December 2023), gazetted 23 February 2024 https://sarf.org.za/gov-gazette	• Public transport subsidies will address spatial imbalances and increase affordability of public transport services. • Subsidisation of public transport will be based on public transport plans approved by municipal councils. • Public transport subsidies will be managed by municipalities and appropriated from national and provincial treasuries, as well as own sources of finance. • Costs will be recovered but subsidies will support accessibility. • Direct user-targeted subsidies will require a fare collection system allowing for a means-tested form of digital identification. • Operators will be paid a fee per kilometre to recover costs and generate a margin for operational viability. • Public transport subsidies will include operational and capital support. • Rural areas will have proportionately more subsidy per kilometre. • Accelerated funding subsidies for mini-bus taxi operators, and prevailing contracted bus operators, particularly in rural areas.
The National Land Transport Amendment (NLTA) Act 23 of 2023 https://www.gov.za/sites/default/files/gcis_document/202406/50800nationallandtransportamendmentact232023.pdf	Gives provinces powers to conclude new public transport contracts (negotiated, tendered and commercial) in municipal areas where municipalities lack capacity.
National Land Transport Strategic Framework (2023–2028) https://www.gov.za/sites/default/files/gcis_document/202303/48176gon3119.pdf	Provides key performance indicators on improved access and funding for learner transport; updated Comprehensive, District, and Local Municipal Integrated Transport Plans, incorporating Public Transport Plans, comprised of Integrated Public Transport Network (IPTN), Rationalisation Plan, and Operating Licence Strategy.
Competition Commission's Land Based Public Passenger Transport Sector, Main Report, March 2021 https://www.compcom.co.za/wp-content/uploads/2021/04/PTMI-Non-Confidential-14-April-2021-FINAL.pdf	Recommends the following: • The transport subsidy policy be revised to clarify (and extend) support to the mini-bus taxi industry and unsubsidised bus operators who provide public transport. • Contracts with bus operators be clarified, extended, made more competitive, equitable and integrated in the IPTN. • Rural bus transport services be better supported. • Transport functions and funding be decentralised to lower levels of government. • Models for IPTN be reviewed to drive best fit and financial viability.
Just Energy Transition Investment Plan (JET-IP) https://www.climatecommission.org.za/publications/sa-jet-ip	Proposes NEV investment programme from 2023 to 2027 at a cost of ZAR 128 billion. Of this, ZAR 6,1 billion has been allocated to public transport transition. This is for support to investments in public transport such as buses, taxis and fleets, funding the charging infrastructure and energy storage (including associated infrastructure) and for supply chain investments in local assembly.

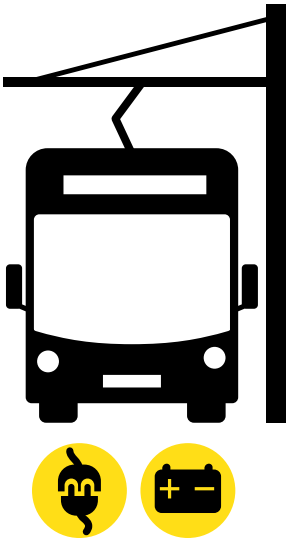
THE CASE FOR INVESTMENT IN E-BUSES

The case for investment in e-buses rather than Euro V Internal Combustion Engine (ICE) buses is underpinned by a number of elements. These are a competitive total cost of ownership (TCO), GHG emissions and other air pollutant savings, and socio-economic opportunities.

Other benefits to being an e-bus adopter include the likelihood that the manufacture of ICE buses will become increasingly rare, resulting in lower access to parts. The JET-IP provides an indication that concessional finance could be allocated to public transport EVs, which could bolster the investment business case.

Evidence from on-the-ground testing

GABS has been testing e-buses and their data indicates a number of areas where operational savings are achieved, as well as where additional costs and challenges are experienced. In 2024, GABS signed a deal to acquire 120 electric buses from Chinese manufacturer BYD, following four years of testing.



Understanding New Energy Vehicle (NEV) buses

The key difference between ICE vehicles and NEVs is the omission of the internal combustion engine, fuel system and exhaust system.

Battery electric vehicles (BEV) (e-buses): All-electric vehicles with an electric propulsion system powered by rechargeable onboard battery packs, using an electric motor and motor controllers for propulsion instead of an internal combustion engine.

74%
SAVING ON ENERGY COST

50%
SAVING ON SPARE PARTS

80%
SAVING ON OIL AND LUBRICANTS

30%
SAVING ON LABOUR

GABS 'real life' e-bus testing data

Savings	Costs and challenges
74% saving on energy cost	Taxes and duties are 50% of the landed cost
50% saving on spare parts	Loadshedding
80% saving on oil and lubricants	Double the space is required for parking (for charging)
30% saving on labour	

Source: Golden Arrow Bus Services, 2023. Potential and challenges for large scale introduction of electric buses in South Africa. Presentation at the Transport Forum, 2023.

- Following the 2023 WWF e-bus study, C40 did in-depth research into the current domestic bus market, highlighting opportunities to provide the most viable business and financial models that can support scaled deployment of e-buses in South Africa. This includes bus ownership and service provision models currently in use in Johannesburg, Tshwane, Ekurhuleni, Cape Town and Durban.[8] The 'Accelerating a market transition in South Africa: Insights into the bus industry and emerging electric bus models' report came out in January 2024.[9]
- The Global Environmental Facility/ DBSA/ SANEDI project 'Accelerating the shift towards electric mobility in South Africa: Demonstrating and up-scaling electric mobility in the public transport sector in South Africa' sought to drive the acceleration of e-bus adoption through improved data and models, and to get up to 50 e-buses on South African roads.

Trolleybuses with batteries: Propelled by an electric motor, drawing power from either overhead wires via connecting poles called trolleys, from ground contact, or onboard rechargeable batteries.

Plug-in hybrid vehicles (PHEV): Similar to BEVs but achieve motion through an electric motor using rechargeable batteries and have an additional internal combustion engine powered by conventional fuel.

Fuel cell buses: Use electric energy produced through an electrochemical reaction both for the powertrain and for support battery charging.

Modelling the savings from e-bus adoption

This analysis is based on Sustainable Energy Africa's (SEA) model,[10] with some input value parameter updates, to compare the TCO of ICE and e-buses as well as GHG and air pollutant savings.

Key parameters in the model

- Full fleet of 25 000 is replaced by BEV buses to indicate scale of opportunity.
- Prices are for 2023 and the impact of inflation and/or price increases are factored into maintenance, insurance and energy costs.
- Operational life of a bus is 15 years; each bus travels an average of 40 000 km per year.
- Total Cost of Ownership (TCO) = Capital cost + (Maintenance cost + Energy cost) / (1 + Discount Rate)^Number of years). Excludes cost of charging infrastructure.
- Model only allows for 12-metre (95% of buses) and 18-metre buses (5% of buses); compared to 12- and 18-metre buses that meet Euro V diesel standards.
- Current estimates of unit cost of 12-metre diesel bus, range between ZAR 3 million and ZAR 4,79 million with e-bus equivalent between 200% and 259% (full landed cost inclusive of taxes and duties).
- The capital cost of one ICE 12-metre bus is estimated to be ZAR 3,2 million in 2023, with our base case for the e-bus calculated at 250% of this or ZAR 7,990 million. An 18-metre diesel bus costs about ZAR 5,3 million and e-bus ZAR 13,3 million.[11]
- E-buses are grid charged, a direct Eskom rate, linked to the IRP 2019 scenario.

Total Cost of Ownership (TCO) based on input assumptions

- A 12-metre diesel Euro V bus, purchased in 2023 is estimated to cost a total of **ZAR 23,1 million** over its 15 years, while the e-bus equivalent is estimated to cost a total **ZAR 26,7 million**, or 16% more.
- An 18-metre diesel Euro V bus, purchased in 2023 is estimated to cost a total of **ZAR 35,8 million** over its 15 years, while the e-bus equivalent is estimated to cost a total **ZAR 41,8 million**, or 17% more.

Capital costs: The higher TCO of an e-bus is driven by capital costs, which is in turn, a function of the high costs of batteries and the duties and taxes on e-bus imports.

Taxes and duties: Both ICE buses and e-buses incur 15%–20% import taxes, however e-buses also pay an *ad valorem* duty of up to 30%. This puts taxes and duties on e-buses between 45% and 50%. The Department of Trade, Industry and Competition's draft Auto Green Paper indicates that NEV import and excise duties may be adjusted. Reducing the taxes and duties so that the e-bus purchase price drops to 200% of an ICE bus, from 250%, makes the e-buses TCO competitive:

Insurance costs: The highest cost item in an EV's TCO. High-tech parts of NEVs can involve expensive repairs. Nonetheless, insurance costs for e-buses may currently be overstated due to limited data on e-bus operations in South Africa. Once data is available, insurance companies may reduce premiums, further reducing the e-bus TCO.

Energy costs: Lower for e-buses than ICE buses, as EVs use very little energy per km travelled.

Maintenance costs: Lower on e-buses as there are fewer moving parts.

- The TCO for a 12-metre bus is almost the same: ZAR 23 million for the ICE bus compared with ZAR 23,4 million for the e-bus.
- The TCO for an 18-metre electric bus would drop to ZAR 36,3 million compared with ZAR 35,8 million for the ICE bus.

Given equivalent duties and taxes, an e-bus fleet of 23 750 12-metre buses and 1 250 18-metre buses, would be 1% more costly than the equivalent Euro V ICE fleet, at ZAR 600 billion compared with ZAR 593 billion.

TCO replacement cost of 25 000 bus fleet:

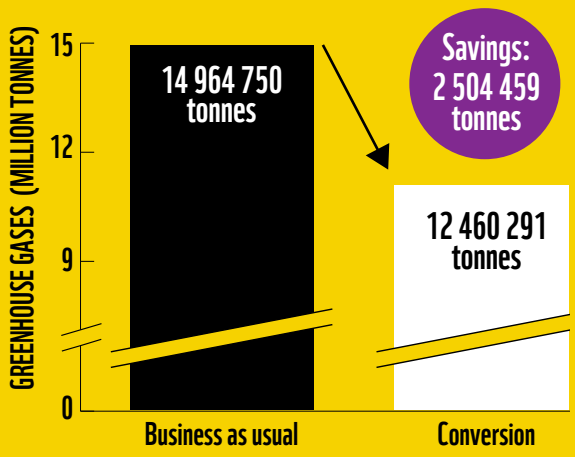
ICE vs e-bus comparison (e-buses at 200% purchase price of ICE bus)

Buses	**Total cost of 25 000 bus replacement**
ICE buses	ZAR 592,8 billion
E-buses	ZAR 600,3 billion
E-bus fleet additional cost	ZAR 7,5 billion

CLIMATE CHANGE BENEFIT

E-buses will be charged by the grid. Overall, savings in GHG emissions over the 15 years period for the total e-bus fleet is estimated to be 2,48 million tonnes, or a saving of 17%, relative to diesel buses. It is also likely that some buses will in part be charged directly from renewable energy sources, not the grid, resulting in further emission reductions.

COMPARING THE GHG EMISSIONS SAVINGS OF E-BUS FLEET ADOPTION



Source: Author, based on SEA model. Model for comparison of total cost of ownership and emissions of internal combustion engine (ICE) vehicles vs electric vehicles (EVs) for municipal fleets.

NOTE: GHG emissions are calculated based on the current grid emissions factor, as well as assumptions as to how this may change in the future (based on the IRP 2019 scenario). Should the coming IRP include far more renewables in the electricity supply mix, the GHG emissions savings would markedly improve.


100%
ELECTRIC
ZERO
EMISSIONS

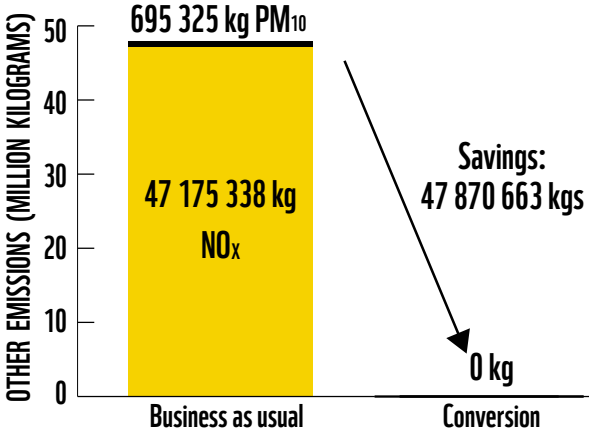
GETTING ON BOARD WITH E-BUSES

SOCIO-ECONOMIC BENEFITS

Health

E-buses remove noxious tailpipe emissions altogether, significantly improving health outcomes. A total of 47 870 663 kgs of pollutants could be totally avoided over 15 years with a full 25 000 fleet replacement of e-buses. Nearly all savings are from the removal of NOx, with PM_{10} adding a small share of the total.

COMPARING THE NOx AND PM_{10} SAVINGS OF E-BUS FLEET ADOPTION



Source: Author, based on SEA model. Model for comparison of total cost of ownership and emissions of internal combustion engine (ICE) vehicles vs electric vehicles (EVs) for municipal fleets.

NOTE: Air pollutant emissions are calculated based on the amount of diesel or petrol used and emissions factors. Calculations have only been included for NOx (Nitric oxide and Nitrogen dioxide) and PM_{10}.

Transportation was responsible for 7% of deaths from air pollutants (2015); 48% of these deaths are attributed to on-road diesel vehicles. Strong health benefits will result from the elimination of air pollutants.

Electric motors run silently, reducing noise pollution. According to Professor Havenga of Stellenbosch University, who pioneered the calculation of externality costs of freight transport in South Africa, these costs are borne by society, such as from accidents, congestion, policing, climate change impacts – and noise. In 2009, the cost of noise from freight transport was ZAR1 billion.[12]

Direct and indirect employment

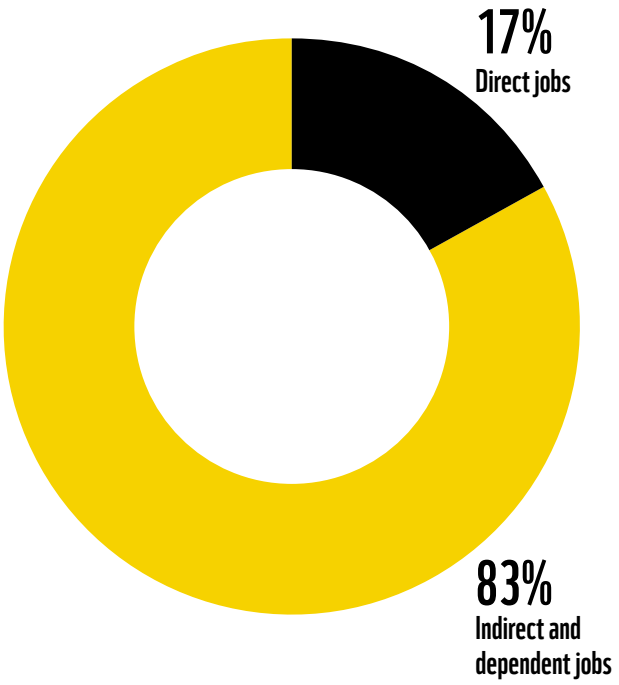
The transition to NEVs will have a significant impact on automotive manufacturing and its supply chains, affecting jobs, skills and income. The impact on the petroleum industry supply chain remains uncertain but is likely to be profound.

In South Africa, the bus industry directly employs approximately 34 200, with about 171 000 more indirectly dependent on it.[13] Indirect impacts include a large number of suppliers, such as bus and chassis manufacturers, and fuel and tyre companies.

In 2021, the total wage bill for 'other scheduled land transportation services' was ZAR 3 billion, down from ZAR 3,8 billion in 2020 – equating to an average annual wage of ZAR 87 719 per person in 2020.

To mitigate job losses in the shift to e-buses, reskilling and upskilling programmes will be essential in absorbing existing workers from the diesel bus industry into emerging opportunities. Building a local e-bus manufacturing or assembly industry could play a key role in offsetting job losses.

DIRECT JOBS AND OTHER JOBS IMPACTS FROM THE BUS INDUSTRY



Source: SABOA input, Competition Commission Market Inquiry, 2021.

WHAT OF THE MANUFACTURING POTENTIAL?

The automotive manufacturing industry contributed 4.9% to South Africa's GDP in 2022 (2.9% manufacturing, 2.0% retail).

OEMs are likely to assess South Africa's attractiveness as an e-bus manufacturing destination based on:

- The cost and CO_2 footprint of logistics
- Access to green and low-cost energy
- Investment and infrastructure support provided by Government
- The support incentives that are in place to lower the cost of production and stimulate demand.[14]

The 80% local content requirement for bus bodies could drive the localisation and electrification of public transport. While most parts are imported and assembled locally, South Africa's minerals, materials and capabilities could support greater localisation.

With no OEM-supplied e-buses currently available, developing a local manufacturing base could:

- Reduce the purchase price of these vehicles
- Reduce servicing costs and replacement parts, such as tyres, batteries and electrical components
- Create direct and indirect jobs.

South African bus manufacturing companies

Bus supplying companies	**Local bus body builders**
Isuzu Motors SA	Busmark
MarcoPolo	MCV-SA
Tata	Irizar
Iveco	CNH Industrial SA
Mercedes-Benz	Busco
Volvo Group Southern Africa	Real African Works
MAN	
Scania	

Source: National Association of Automobile Manufacturers of South Africa (NAAMSA), 2023. Global Environmental Facility, 'Accelerating the shift towards e-mobility in South Africa'.

Attracting NEV manufacturing will require a substantial increase in investments across the automotive value chain, supporting component technology, supply chain expansion, and workforce reskilling. New jobs associated with NEVs will involve design, engineering and manufacturing.

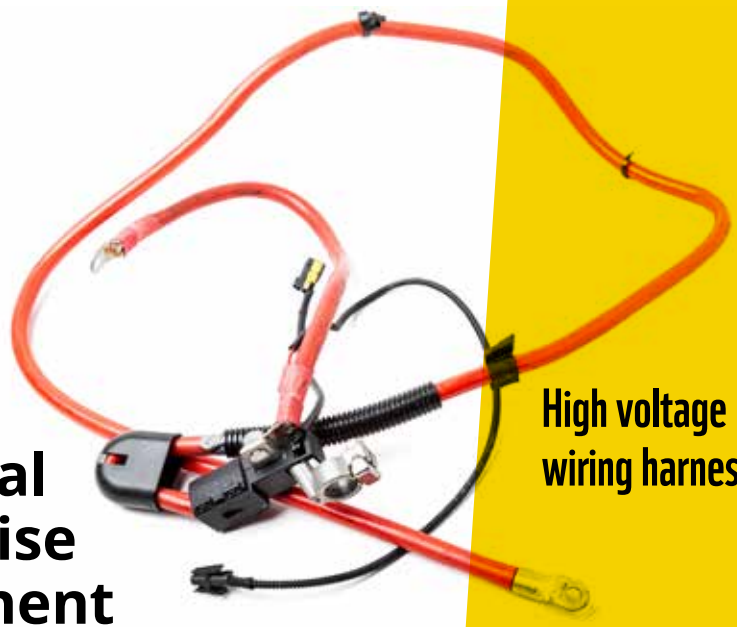
Pursuing e-bus manufacturing could open regional export markets, given likely preferential rates for intra-continental trade. This could drive new growth in the local automotive manufacturing industry leading to new jobs and capabilities. With established automative assembly operations and a regional export footprint, South Africa is well positioned to lead this shift.

Potential to localise component manufacturing

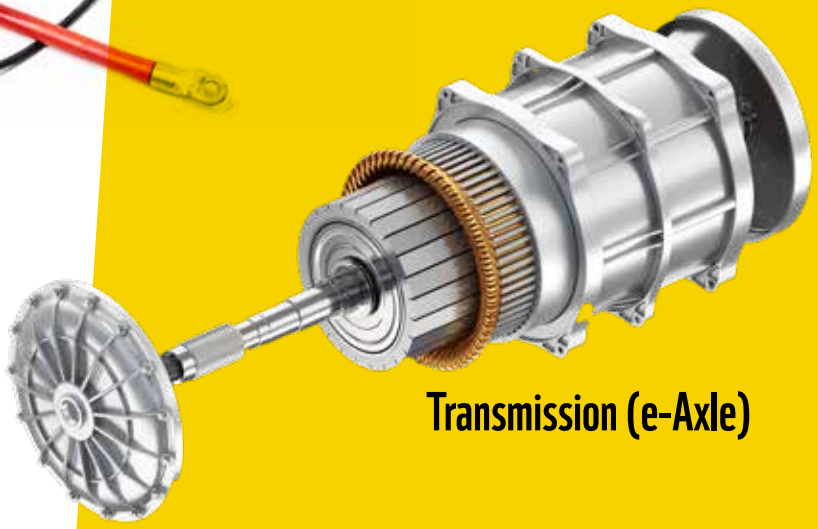
The industry supports many suppliers, such as bus and chassis manufacturers, and fuel and tyre companies.

The National Association of Automotive Component and Allied Manufacturers (NAACAM) undertook a study into three key component systems for the transition of ICE manufacturing to NEV manufacturing.[15] While the focus was on light passenger vehicles, many of the recommendations apply to e-buses too.[16] Much of what industry advocated is reflected in the Electric Vehicles White Paper (2023).

Key component systems have been identified in the transition from ICE manufacturing to NEV manufacturing:

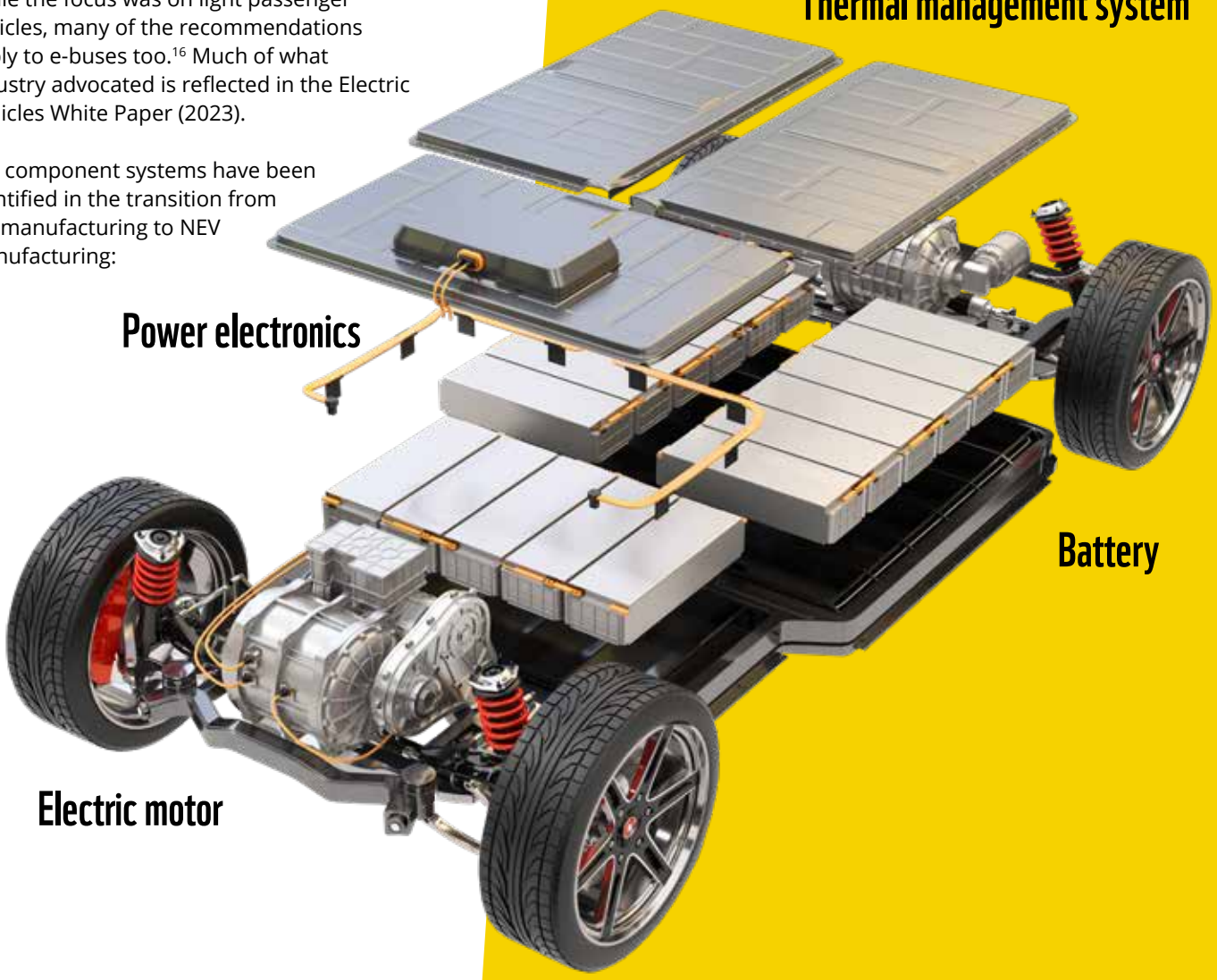


High voltage wiring harness



Transmission (e-Axle)

Thermal management system



Power electronics

Battery

Electric motor

BARRIERS TO E-BUS ADOPTION

- **Infrastructure and market uncertainty:** Poor roads, unclear subsidies and contracts, a declining bus passenger market, competition from the mini-bus taxi industry, and uncertainty over integration into IPTNs.
- **Operational and investment barriers:** Complex city layouts, limited government capacity, lengthy procurement and contractual processes, currency volatility, and multiple operators with varying technical and financial capacity.[17] Regulatory changes may be needed to address the higher weight and length of e-buses.
- **Fiscal constraints:** Limited government funding and competing priorities further challenge new fleet acquisition.[18]
- **Manufacturing gaps:** Few local bus body manufacturers exist, and only 700 units are sold annually. Bus OEMs require at least 1 000 units per annum per OEM for localisation viability.
- **Procurement costs:** High e-buses costs, including *ad valorem* duties and high insurance terms.

DRIVERS OF THE ADOPTION OF E-BUSES

- **Global best practices:** Effective national policies in five key areas drive heavy-duty ZEV adoption – target-setting, regulations, incentives, infrastructure, and fleet purchases.[19]
- **Policy momentum:** South Africa's NDC, Green Transport Plan, and city-level commitments support e-bus adoption. Addressing policy uncertainty and cost gaps could make e-buses the preferred choice for new purchases.
- **Operator benefits:** Lower operating costs and access to concessional finance linked to ZEV targets make e-buses financially attractive for fleet renewal.
- **Localisation of manufacturing:** High import costs create a strong business case for developing local e-bus and component parts manufacturing.
- **Lower fares:** Savings on operating costs need to be shared with commuters in the form of lower fares.

ACTION POINTS

- **Harness policy:** Harness the enabling policy to apply to e-bus procurement and localised manufacture. For example, under the Electric Vehicles White Paper there is a temporary reduction on import duties for batteries in vehicles produced and sold in the domestic market, which will bring the price of e-buses on a par with ICE buses. The Support Programme for Electric Vehicles provides for reimbursement grants and preferential depreciation for investments in manufacturing.
- **Coordinated procurement:** A coordinated effort is required to manage the procurement of new buses to drive localisation of componentry systems while improving passenger experience.
- **Seek regional markets:** Expand the market size for local manufacture. Where other countries are already ahead of South Africa, specialise in particular components they need.
- **Lower fares:** Develop formulas for fares which factor in reduced operating costs of e-buses and public transport subsidies to lower fares.

ENDNOTES

1 International Energy Agency (IEA), 2022. *Global final energy demand for trucks and buses by fuel, 2000-2021, and 2030 in the Net Zero Scenario*, IEA, Paris. https://www.iea.org/energy-system/transport/trucks-and-buses

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15 Singh, S., 2023. *NEV research from the South African automotive component supply base*. National Association of Automotive Component and Allied Manufacture (NAACAM).

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Transport is a key sector in the transition to a low-carbon and climate-resilient South African economy. This involves adopting a reduce-shift-improve approach: reduce the need for transport through spatial planning and shorter trade routes, shift from higher to lower greenhouse gas emissions modes, and improve technologies. Expanding and improving public transport is necessary to improve the lives of those who use it and assist with the shift from private to public transport. Electric vehcles (EVs) play their part in the 'improve' dimension.

Many of the markets for vehicles manufactured in South Africa are rapidly changing to electric vehicles for passenger transport, with some jurisdictions banning future sales of internal combustion vehicles, which run on fossil fuels. In response to these global trends and South Africa's own need to decarbonise our economy while retaining and creating jobs, government has moved to support local manufacturing of EVs and components, and local market development, with input from industry. The focus has mainly been on private cars.

EVs for public transport buses and paratransit mini-bus taxis deserve special focus, not only as an important piece of the 'shift' approach, but because they serve the majority of South Africans. Operating cost savings could in part be used to bring down fares, and there are other benefits such as eliminating tailpipe pollution and noise.

Based on a study commissioned in 2023, this publication characterises the market for electric buses in South Africa, looks into enablers in policy, unpacks the case for investment in electric buses, explores local manufacturing potential, and sets out the climate and socio-economic benefits. The study was sense-checked in a workshop hosted by the Sustainable Transport Hub of the Alliance for Climate Action South Africa, with participants from five cities, SABOA, businesses in the sector and OEMs, NAAMSA, SANEDI, DFIs, and National Treasury and the Departments of Transport and of Trade, Industry and Competition.

The Alliance is convened by C40 Cities, the National Business Initiative and WWF South Africa. It comprises cities and businesses which stand up for an economy with net zero carbon emissions by 2050, take their own action to help South Africa get there, and collaborate on climate change mitigation and/or adaptation to achieve more than they might acting alone.

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WWF South Africa, First Floor, Bridge House, Boundary Terraces, Mariendahl Lane, Newlands 7735
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