

# UPSKILLING AND RESKILLING THE TRANSPORTATION INDUSTRY IN SOUTH AFRICA

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## ABSTRACT

The realities of climate change and its consequences have played a significant role in spurring on the development of technologies designed to reduce greenhouse gas emissions such as electric vehicles. Nations in the European Union and China have invested greatly into the development of electric vehicle technologies and have heavily subsidised programs aimed at converting existing diesel engine bus fleets with battery powered buses. The widespread adoption of electric vehicles requires that a large portion of the workforce are upskilled and retrained, with demand growing for electricians, skilled technicians, and mechanics. This essay aimed to highlight and address the need for employees of bus companies in South Africa to be upskilled and reskilled to operate and maintain electric busses by providing a framework for staff retraining. Structural issues have acted as a barrier to widespread electric vehicle adoption within South Africa and Africa broadly. Perennially inconsistent electricity supplies, coupled with a lack of prerequisite skills in the workforce, and half-hearted or non-existent government investment in electric vehicle infrastructure makes rapid adoption infeasible. Despite these issues, many stakeholders within the public transportation sector are showing greater interest in acquiring electric vehicles. To ensure a smooth transition from diesel engine to battery powered vehicle fleets, operators should gradually upskill and reskill new employees using external expert advisors. New employees who complete their training should then be contractually obligated to gradually provide training to pre-existing employees, thus developing skills internally within the organisation and decreasing the overall cost of training.

## 1. INTRODUCTION

Reskilling is commonly defined as the act of teaching an individual a new skill which could improve their employment prospects. In contrast, upskilling is the act of teaching an employee a new skill to expand their capabilities and thus improve their performance in their current occupation (LinkedIn, 2024).

South Africa currently experiences a serious skills shortage which contributes greatly to its severe unemployment crisis (Bernstein, 2014). This skills shortage is notably present within the transportation industry, with there being a dearth of both qualified drivers and mechanics required to operate and service large commercial vehicles (Pillay, 2022). These conditions often lead to under-qualified personal being hired, resulting in sub-standard vehicle maintenance, reckless driving, and loss of time, revenue, and potentially lives in accidents (Orlek, 2021). Emphasis on skills development should be present within the public transportation sector due to increased risk of death and/or injury when transporting passengers.

Globally, the growing threat of rapid climate change has spurred on the development and adoption of electric vehicles (EV's) as a countermeasure to reduce vehicle greenhouse gas emissions (Heffling & O'Dea, 2018). Many nations across the world have provided public funding to support initiatives aimed at replacing existing diesel engine busses with battery powered ones. These initiatives have found success within Bus Rapid Transit (BRT) systems that receive government subsidies (Sustainable Bus, 2023). Due to major mechanical differences between diesel engine and electric vehicles, both maintenance crews and drivers must be retrained and upskilled (Korte, 2023). This retraining also results in reskilling, as employees and/or trainees are provided with new skills that could aid them in finding more employment opportunities in a growing industry sector (Korte, 2023).

Electric vehicle adoption in South Africa is by contrast, still in its infancy. Many barriers exist that hinder this process from an inconsistent electricity supply to a lack of adequate public funding (Republic of South Africa, 2023). Despite this, a gradual implementation of EVs to BRT fleets is being undertaken; however, discussions largely revolve around issues of vehicle acquisition and do not place sufficient emphasis on the implementation of retraining programs for drivers, mechanics, and support staff (GreenCape, 2023).

This essay aims to provide a framework for upskilling and reskilling bus drivers and support staff so that they can drive and maintain electric busses. It will begin with an overview of existing EV implementation programs abroad and how existing and new employees were upskilled. This will be followed with a review of EV adoption by BRT companies in South Africa, with a particular focus on Golden Arrow Bus Services which operates in and around the City of Cape Town. Finally, a framework for staff retraining will be provided. The essay will close with a conclusion summarising its contents.

## **2. OVERVIEW OF EXISTING ELECTRIC VEHICLE IMPLEMENTATION PROGRAMS IN PUBLIC TRANSPORT OUTSIDE SOUTH AFRICA**

The widespread adoption of electric vehicles in the public transportation sector was pioneered in China where numerous BRT systems were electrified since 2010 (You, 2023). The adoption of electric busses was generously subsidised and was accompanied by large-scale investments in critical related infrastructure such as charging stations (You, 2023). The push for electrification has been championed by the Chinese government which aims to reduce vehicle emissions that have contributed greatly to the nation's severe pollution crisis. As of 2022, roughly 95 percent of all electric busses globally are found in China (You, 2023). In addition to these measures, the government has heavily funded research concerning the development and maintenance of EVs. Parallel investments into other sustainable energy technologies have allowed for the training of more electrical engineers, electricians, and mechanics that could help maintain an ever-expanding fleet of EVs and its support systems in the nation (Agarwal *et al.*, 2021).

The European Union has seen the largest increase in electric busses in circulation outside of China (Sustainable Bus, 2023). Member governments have similarly provided substantial subsidies to existing public transport companies to electrify their bus fleets, in accordance with the Sustainable Development Goals (Sustainable Bus, 2023). The populations of member states are generally well educated, and many skilled workers migrate to these nation's from abroad seeking higher salaries and better standards of living. As such, the European Union is well positioned for fourth industrial revolution technologies such as EVs (Sustainable Bus, 2023).

EV's have not yet penetrated the African market due to several structural barriers. High levels of poverty, poor infrastructure quality, inconsistent electricity supplies, and inefficient bureaucracies hinder rapid adoption of such technologies (Kemp, 2023). In addition to these issues, there are perennial shortages of skilled electricians and mechanics in African nations (Kemp, 2023). For EV's to function effectively on African road networks, a greater number of these individuals are required. High levels of poverty and a strong reliance on second hand vehicles, even for public transport operators, makes many EVs unaffordable (Breheny, 2023). A lack of domestic production coupled with high import costs adds to the problem of affordability (Ahmad *et al.*, 2022). Smaller electric bikes and scooters have seen some success in recent years though, due to their compact size, relative affordability, and compatibility with existing power infrastructure (Ahmad *et al.*, 2022).

### **3. ELECTRIC VEHICLE ADOPTION IN SOUTH AFRICAN BRT SYSTEMS: A GOLDEN ARROW BUS SERVICES CASE STUDY**

As of March 2024, the widespread adoption of electric vehicles by South African BRT operators has not yet occurred (Crouth, 2023); however, trials have been undertaken by Golden Arrow Bus Services, with the company achieving positive results (Crouth, 2023).

Golden Arrow is a private and publicly subsidised operator within Cape Town that provides public transportation for 220 000 passengers daily (GABS, 2023). Despite facing harsh competition from the informal and unregulated minibus taxi industry, the company still provides a crucial service to thousands of commuters.

From April 2021 to September 2022, Golden Arrow tested the capabilities of two modified electric busses along all operational routes, with positive results (GreenCape, 2023). The company did not find any significant operational faults with the electric busses over the course of the distance travelled, thus indicating the future possibility of wider fleet electrification. More importantly for the purpose of this essay, Golden Arrow found that the utilisation of these electric busses resulted in 50 percent savings for spare parts and 80 percent savings for oils and lubricants which are heavily consumed by diesel engines. This apparent reduction in maintenance costs is promising for future EV adoption; however, such a move will require careful planning as maintenance crews, drivers, and support staff must be upskilled to work with battery powered vehicles. Additionally, bus depots must be refitted with charging stations and new spare parts. Existing electricity shortages must be considered as well, with recharging schedules being integrated into periods of low energy utilisation. Additional generation capacity using solar panels and generators at depots may be required to offset unreliable supply from the national grid.

### **4. FRAMEWORK FOR BUS ELECTRIFICATION AND STAFF RETRAINING IN SOUTH AFRICA**

The relative rarity of EVs in South Africa requires that bus operators within South Africa thoroughly plan their implementation processes. The lack of maintenance personal and drivers that are sufficiently experienced with EVs, coupled with a lack of pre-existing infrastructure and an inconsistent power supply in the country all but eliminates any plan for rapid fleet electrification (Republic of South Africa, 2023). For an EV implementation program to succeed for a bus operator such as Golden Arrow in South Africa, its change-over period will be incremental growing in size over time.

It is advised for operators to begin by training and reskilling new employees – mechanics, drivers, and support staff – in the maintenance and operation of electric busses. The lack of experienced employees in South Africa will require operators to facilitate training using foreign experts. These experts should be contracted from nations and companies with extensive experience with electric bus systems, such as China, the Netherlands, Germany, etc.

New employees who successfully complete training will then begin to exclusively operate on new electric busses, during which time their performance should be monitored. These newly trained employees should be contractually obligated to supervise and lead the retraining program of pre-existing maintenance staff and/or drivers for a set period, with a restraint of trade clause included to maintain internal talent. Time spent training and supervising should be compensated for to encourage enrolment into the program. For instance, every hour spent training could be compensated for at a rate of 50 percent of their base salary. In this way, employees are slowly upskilled within the company without having to constantly rely on expensive external advisors. The pace of EV adoption should match that of staff retraining and facility refitting.

A gradual implementation and training program would allow operators to effectively assess the broader feasibility of EV busses along their routes over time. Should operators discover the emergence of unexpected costs, targeted solutions can be implemented without running the risk of stalling operations on a large scale. As such, a cautious approach could prevent wasteful expenditure.

## 5. CONCLUSION

Due to the ever-looming threat of climate change, many nations across the globe have begun to invest heavily into EV technology. Electric busses have because of these developments, exploded in popularity, particularly in China and the European Union. Although the EV industry is still small and relatively insignificant within South Africa, stakeholders within the transportation sector are showing greater interest with bus operators such as Golden Arrow Bus Services having already performed test trials on prospective EVs. With the future proliferation of electric busses being likely, it is important that operators implement an incremental EV adoption plan in line with employee upskilling and reskilling, depot refitting, and energy generation capacity. In this way, a smooth transition to EV adoption within the bus sector can be achieved through internal skills development that will prepare their employees for fourth industrial revolution technologies.

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