

South Africa E-mobility Key Lessons Learnt

Country	South Africa
Name of Company / Implementer	uYilo mobility programme at Nelson Mandela University (NMU)
Type of Business Model	Pay per use
Type of Use Case	E-mobility

Summary

Alicedale, a rural town in South Africa, faces major challenges including high unemployment, poor transport access, unreliable electricity, and limited amenities. To address these issues, the SESA project established a Living Lab featuring a solar energy center and two micro-electric vehicles for passenger and cargo transport. This initiative promotes affordable mobility and renewable energy adoption. The solar center uses second-life EV batteries for off-grid energy storage, while the vehicles support community transport needs. The project aims to improve quality of life and serve as a replicable model for similar communities in other South African provinces and across Africa.

The model

Taxi service: pay-per-trip.

Customer segment: Alicedale community members and Care Community Centre: R10 (0.5 Euro) per trip (5-20km radius). Tourist excursions: R50 (2.5 Euro)/100 (5 Euro)/150 (7.6 Euro) per person for different tourist packages.

Cargo service: pay-per-trip.

Customer segment: Alicedale business owners and CARE Community Centre: Minimum cost of R50 (0.5 Euro), depending on the weight, distance and nature of the goods to be delivered.

Key figures under the SESA project

- One cargo e-vehicle: 171 trips from July 2024 - Apr 2025, Total: 966 km
- One passenger e-vehicle: 175 trips from July 2024 - Apr 2025, Total 3991 km.

Community-Centered Design Drives Adoption

The micro-EV initiative in Alicedale was tailored to meet the mobility needs of a vulnerable, low-income community. The initiative demonstrated that early engagement, user needs assessments, and inclusive service design, tailored culturally sensitive awareness campaigns and continuous capacity building to foster trust, develop local skills are critical for adoption and to ensure long-term success. High user satisfaction (96% for passenger EVs, 79% for cargo EVs) confirmed the relevance of the solution.

Operational Efficiency and Data Collection Are Crucial

The use of QR codes, vehicle logs, and power meters enabled real-time monitoring of vehicle usage, charging patterns, and user feedback. This data-driven approach helped refine service delivery and informed business model development. Reliable EV charging and supporting infrastructure are essential for scaling e-mobility and renewable energy in rural settings.

Affordability Is Essential for Sustainability

Despite strong demand, the business model was not financially viable without subsidies. The community's willingness to pay (R10 per trip) was significantly lower than the cost-recovery threshold. This highlights the need for public-private partnerships (PPPs) or government subsidies to bridge the affordability gap in low-income settings, to support introduce public e-mobility services.

Subsidies Enable Viability and Scalability

Financial modeling showed that subsidies covering 80–100% of costs in the first two years, and 50% from years 3–15, allowed the business to become profitable. Without subsidies, neither the passenger nor cargo micro-EV models reached break-even over 15 years. This underscores the importance of strategic public financing aligned with national policies like South Africa's Just Energy Transition Plan (JET-IP).

Policy alignment boosts scalability

Collaboration with local authorities aligning with national policy 'South Africa's Just Energy Transition Plan' has supported long-term scalability of solutions.

Flexible business models improve access

Pay-as-you-go and PPP-subsidized models made e-mobility services more affordable for low-income residents.

Adaptive management meets diverse needs

Demand adapted timelines, responsive logistics, and tailored resource allocation support varied customer segments for increased use of the services.

The Alicedale Living Lab model

has increased interest from other provinces, with Limpopo already engaging stakeholders to replicate it. Case studies and innovative financing models could expand e-mobility with renewable energy adoption in underserved semi-rural communities.



Figure 2:
The passenger e vehicle

Next steps

To ensure long-term sustainability of the e-mobility initiative in Alicedale, the next steps include securing public-private partnerships to subsidize operational costs and expand services. Additional micro-electric vehicles will be acquired from October 2026 to increase service coverage and revenue. Continued data collection and community engagement will refine service delivery and pricing models. Capacity-building for drivers and operators, along with infrastructure upgrades, will support scalability. Replication across other South African provinces and African regions will depend on identifying communities with either sufficient income levels or access to subsidies, ensuring affordability and viability of the business model.

About the company/implementer

uYilo is an eMobility programme hosted by Nelson Mandela University, advancing sustainable transport and energy solutions in South Africa. With expertise in battery technology, smart grids, and micro-mobility, uYilo leads innovation through Living Labs, public-private partnerships, and community-driven pilots, including solar-powered electric vehicle initiatives in underserved regions.



Figure 1:
The cargo e-vehicle