Feasibility Report

Feasibility Report: Nigeria Solar Electric Car Urban Taxi Carbon Project
Date: April 01 2025
Location: Nigeria

Project Owner: Esse Mobility
Crediting Period: 5 years (2024–2028)
Carbon Standard: Tyndall Carbon Standard (AMS-III.C)

1. Executive Summary

- The **Nigeria Solar Electric Car Urban Taxi Project** proposes replacing 1,000 gasoline-powered taxis in Lagos and Abuja with solar-electric vehicles (Esse Mobility Purity EVs) to achieve **9,240 tCO_2e/year** in emission reductions. Key findings include:
    - **Technical Viability:** Solar charging infrastructure and vehicle specs align with urban taxi demands.
    - **Financial Feasibility:** Net profit of **$1.12M over 5 years** despite high upfront costs ($18M).
    - **Environmental Impact:** Eliminates 46,200 tCO_2e (5-year net) and reduces oil imports by 4M liters/year.
    - **Social Benefits:** $2,491/year/driver income share and 200+ jobs in green tech.
- **Recommendation**: Approve with concessional financing/scaling to 5,000 vehicles for breakeven viability.

2. Technical Feasibility

Vehicle Specifications

- **Model**: Esse Mobility Purity EV.

- **Range**: 250 km/charge (sufficient for urban taxi daily use).
- **Charging**: 8-hour solar charge (6,000 kWh/year/vehicle).
- **Passenger** Capacity: 4 seats (matches taxi demand).

Solar Infrastructure

- **Charging Stations:** 20 stations (50 chargers each) in Lagos, Abuja, Kano, Enugu, Benue.
- **Solar Potential:** 5.5 kWh/m²/day (Nigeria's average insolation).
- **Battery Storage:** 500 kWh lithium-ion phosphate per station (night use).

Local Adaptation

- **Maintenance**: Local workshops trained for EV servicing.
- **Spare Parts:** Partnership with Lagos Solar Inc. for supply chain.

3. Economic Feasibility

Cost Analysis

Category	Cost
Vehicles (1,000 units)	$18,000,000
Solar Charging Stations	$2,500,000
O&M (5%/year)	$1.23M (5-year total)
Tyndall Fees (7.5%)	$93,555
Insurance (4%)	$49,896
Buffer Pool (10%)	924 tCO_2e/year withheld

Revenue Streams

- **Carbon Credits:** 8,316 tCO_2e/year × $30 = $249,480/year.
- **Co-Benefits:** $5/$tCO_2e$ premium → $41,580/year.
- **Total 5-Year Revenue:** $1.45M.

Profitability

- **Net Profit:** $1.12M (5-year).
- **ROI:**
  - **Esse Mobility:** 4.4% ($785k profit on $18M investment).
  - **Government/Zeco:** Policy/community dividends.
- **Sensitivity Analysis**
  - **Breakeven:** Requires 5,000 vehicles or carbon price >$45/$tCO_2e$.

4. Environmental Feasibility

Emission Reductions

- **Baseline**: 9.24 tCO_2e/year/car (gasoline).
- **Project**: 0 tCO_2e/year/car (solar).
- **Net Reduction**: **9,240 tCO_2e/year** (46,200 tCO_2e over 5 years).

Co-Benefits

- **Health**: 20 DALYs saved/year (WHO).
- **Energy Security**: $0.5M/year saved in oil imports.

5. Social Feasibility

- **Driver Incentives:** 10% carbon revenue share ($2,491/year).
- **Gender Inclusion:** 30% female employment target in EV maintenance.
- **Community Engagement:** Grievance redress officers + battery recycling program.

6. Risk Analysis & Mitigation

Risk	Likelihood	Impact	Mitigation
Solar Infrastructure Failure	Medium	High	Redundant battery storage + local maintenance partners.
Low Driver Adoption	Low	Medium	$2,491/year incentive + training programs.
Carbon Price Drop	Medium	High	60% pre-sold via $25 floor contracts.

7. Regulatory & Compliance

- **Local Permits**: Approved by Enugu State Environmental Agency.
- **Carbon Standard**: Tyndall aligns with **UNFCCC AMS-II.G**; validation by SGS.
- **NDC Alignment**: Supports Nigeria's goal to reduce emissions by 20% by 2030.

8. Validation & Verification

- **MRV**: GPS tracking + IoT sensors for real-time data.
- **Audits**: Annual by **SGS** for Tyndall compliance.
- **Data Sources**: World Bank fuel metrics, Nigeria National Petroleum Corporation.

9. Conclusion

The project is **technically viable** and aligns with Nigeria's climate goals but requires **scaling or grants** to offset high upfront costs. Its **triple-bottom-line impact** (climate, health, economy) justifies approval, with recommendations to:

1. Secure concessional loans for scaling to 5,000 vehicles.
2. Leverage Nigeria's Energy Transition Fund.
3. Partner with international carbon buyers for premium pricing.

Appendices:

- Emission Calculation Worksheets
- Solar Charging Station Blueprints
- Driver Training Manuals

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Appendices:

- Emission Calculation Worksheets
- Supplier Agreements
- Community Survey Results
- Financial Model (5-Year Cash Flow)

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