



TERMS OF REFERENCE (TOR)

TECHNO-SOCIOECONOMIC ANALYSIS FOR THE DEVELOPMENT OF EV BUS TRANSPORTATION NETWORK IN ZAMBIA

1. Background

1 ZEMIA has been established with a mission to support the adoption, development and growth of the entire electric mobility (EV) ecosystem and foster innovation in Zambia by creating a business-friendly environment for the industry and promoting favorable public policy.

ZEMIA has secured funding from Leapfrogging to E-mobility Acceleration Partnership (LEAP) Fund established by the Drive Electric Campaign (a global philanthropic-powered campaign to accelerate the transition to a clean transportation future). The project aims to drive the widespread adoption of zero-emission vehicles in Zambia's public transportation sector, with a specific focus on high-volume intra-city mini-buses and inter-city coaches. The project aims to achieve this through a comprehensive policy framework and techno-economic analysis, fostering multi-stakeholder engagement across the entire electric mobility value chain.

2. Objective

ZEMIA has allocated funding for a techno-socioeconomic analysis for public bus charging infrastructure. The objective of this workstream is to support the creation of an enabling framework for integrated mobility systems. The outcome of this work will highlight investment and technical requirements, and support the development of a roadmap by providing the necessary detail and information necessary for the same. It will outline the environmental and social impacts of this new infrastructure. The techno-socioeconomic analysis is key to outlining the technical and economic viability of a public bus charging infrastructure, and to establishing a viable execution strategy for the sector.

3. Scope

The scope of the project is to conduct a comprehensive techno-socioeconomic analysis for the development of an electric bus transportation network in Zambia. The analysis will focus on creating an enabling framework for integrated mobility systems to support the adoption and growth of zero-emission public bus transport. The objective is to provide the necessary detail and information required for the development of a roadmap for the EV bus transportation network and will complement other workstreams being undertaken by the LEAP project. The analysis will cover three main aspects: Technological Analysis, Economic Analysis, and Social and Environmental Impact Analysis.



4. Proposed Methodology

4.1. Data Collection & Research:

The experts are expected as part of their work cover the following:

4.1.1. Technological Analysis:

- Data collection & research:
 - Current bus transportation figures and statistics e.g. number of vehicles (by type), mpg, mileage, occupancy, routes.
 - EV bus options suitable for market (sample specs of x3 buses)
- Evaluation of data: Consider the technological pros and cons of each type of EV bus and their suitability for the proposed routes (e.g., short urban routes versus long rural routes).
- Operating Parameters: Look into the specific operating requirements of these vehicles such as their range, charging or refueling times, passenger capacity, and performance under various weather conditions.
- Infrastructure Characteristics: Evaluate the kind of infrastructure is necessary for the different bus types. This is to include charging stations, maintenance facilities, and any specific requirements e.g. charge times, power requirements
- Network assessment: review distribution networks at key hotspots to evaluate network upgrade requirements and undertake high level cost/benefit analysis (dependency on EV tariff workstream)

4.1.2. Economic Analysis:

- EV Total Cost of Ownership (TCO): Utilize economic modeling techniques to calculate the TCO of EV busses compared to ICE vehicles. This should factor in upfront purchase costs, operational expenses (such as connection and energy charges), maintenance costs, and the residual value of the vehicle at the end of its life.
- Chargepoint Total Cost of Ownership (TCO): Calculate the TCO of public charging stations. This should factor in upfront purchase costs, operational expenses (such as electricity tariffs), maintenance costs, and the residual value of the vehicle at the end of its life.
- Risk / Sensitivity Analysis: Consider potential risks, such as changes in cost of technology, energy prices etc.



4.1.3. Social and Environmental Impact Analysis:

- Emissions: Calculate the reductions in greenhouse gas emissions and other pollutants achieved by transitioning to EVs.
- Health and Social Benefits: Consider the wider social and environmental benefits of the network, such as improved air quality, noise reduction, and potential health benefits for the public.
- Jobs and Economic Impact: Consider the impact on job creation within the EV value chain and the wider economic benefits of adopting cleaner technology.

4.2. Development of Comprehensive Map:

- Use geo-spatial analysis to identify key hotspots and routes with the highest usage for efficient EV bus deployment.
- Review distribution networks at key hotspots to evaluate network upgrade requirements and conduct a high-level cost/benefit analysis.

4.3. User Feedback:

- Incorporate feedback from existing vehicle operators to understand preferences for bus types, amenities, and schedules, and assess the acceptability of potential changes under an EV model (e.g., acceptable charge times).

4.4. Financial Incentives:

- Identify potential funding gaps and explore available financial incentives to support the implementation of the EV bus transportation network.

4.5. Risk/Sensitivity Analysis:

- Perform risk analysis, considering potential changes in technology costs, energy prices, and other factors that could impact the project's viability.

Applicants are welcome to propose an alternative methodology to achieve the objectives and aims of the work package with proper justification/rationale (including GANTT Chart and costs).

5. Project Timeline

- Experts Selected: 15th September 2023
- Engagements Finalised and Expected Start Date: 29th September 2023
- Expected Completion Date: 30th February 2023



6. Key Deliverables: Should clearly show linkages to Sub work package 2.1 on Barrier Analysis (i.e., key assumptions, sensitivity analysis)

Deliverable	Description	Format	Expected Due Date
1. Techno-socioeconomic analysis	A comprehensive model and analysis comprising assumptions, findings, including data, evaluation of EV options, infrastructure requirements, and user feedback.	Excel Toolkit and Word Report	Wed 13 th December 2023
2. Map	A geo-spatial map highlighting key hotspots and routes with the highest usage to guide the EV bus deployment. Map is to be included in the Comprehensive Report.	Map freely accessible online	Wed 13 th December 2023
3. Economic analysis report:	A detailed report comparing the TCO of EV buses to ICE vehicles and the TCO of public charging stations.	Word (Excel Toolkit)	Wed 13 th December 2023
4. Social and environmental impact analysis report	A report outlining the environmental benefits, health benefits, and economic impact of the proposed EV bus transportation network. The socio-environmental report highlights are to be included in the Techno-socioeconomic report.	Word	Wed 13 th December 2023
5. Business case development	A business case with a cost-benefit analysis for adopting EV buses over ICE buses and the related charging infrastructure. To include an assessment of potential risks and sensitivity analysis to inform decision-making.	Word	Wed 13 th December 2023
6. Comprehensive Report (the Techno-socioeconomic report)	A Comprehensive Report (including Summary Report which can be extracted as a standalone report) presenting the findings and recommendations from the analysis, including data, evaluation of EV options, infrastructure requirements, and user feedback. This report brings together deliverables 1-5.	Word	Wed 31 st January 2024
7. Presentation	A summary presentation of the key findings from the analysis, with the target audience for stakeholders and decision-makers.	Power Point, Summary video	Wed 31 st January 2024



8. Stakeholder Workshop	2hr (incl. Q&A) presentation of the key findings and report to key stakeholders	Virtual workshop	1 week after report presented
9. Capacity building workshop	Experts are to run a (3hr) training and capacity building workshop running through the methodologies, analysis techniques and insights.	Virtual workshop	1 week after Stakeholder workshop
10. Final Completion Report	Concise completion project completion report. Handover of entire project package (i.e. inputs, outputs and toolkits)	Word, Summary Video	1 week following completion of the workshop

7. Expertise required:

Experts selected will be responsible for conducting thorough research, data analysis, modeling, and presenting evidence-based recommendations to support ZEMIA in developing an integrated electric bus transportation network in Zambia. They will work closely with key stakeholders, utilize reliable data sources, and apply appropriate methodologies to ensure the analysis is robust and provides valuable insights for the development of the roadmap.

To deliver the techno-socioeconomic analysis for the development of the EV bus transportation network in Zambia and incorporate capacity building, a range of expertise is required. Experts will need to demonstrate capabilities and expertise in the following areas (relevant and project aligned experience not less than 4 years in respective field):

1. Transportation and mobility innovation and analysis: Expertise in the transportation and mobility domain to conduct the technological analysis of current bus transportation figures, assess EV bus options, and evaluate operating parameters. Experience in public transportation systems, including knowledge of different types of buses, energy requirements, and performance factors.
2. Power sector expertise: Power sector expertise with demonstrable expertise in the evaluation of infrastructure characteristics for EV bus transportation network, including charging stations and power requirements. They should have expertise in assessing distribution infrastructure in relation to introducing charging infrastructure for the transportation sector.
3. Economic analysis: Expertise in economic analysis, comparing the total cost of ownership of EV buses to ICE vehicles, and calculating the cost of public charging stations. Experts should demonstrate expertise in economic modeling and cost-benefit analysis.
4. Environmental and social impact specialism: Experts will need to demonstrate track record in environmental and social impact assessment including quantification of emission reductions, health and social benefits, and economic impact of transitioning to EVs. They should have experience in conducting environmental and social impact assessments.



5. Project Management expertise: A project manager will oversee the entire analysis process, ensuring that the project stays on track, deadlines are met, and deliverables are of high quality. Experts with track record of overseeing similar projects will be prioritized.
6. Optional - GIS expertise: Geographic Information System (GIS) experts to develop a comprehensive map of key hotspots and routes, and support the network assessment. Experts should be proficient in data analysis and GIS tools.

Experts may have experience and undertake multiple activities as deemed appropriate.

8. Minimum requirements

The delivery of the “Techno-socioeconomic analysis for the development of EV bus transportation network in Zambia” may be undertaken by a collection of experts with the requisite skills and expertise. Experts will be selected based on their level of experience and demonstrable track record.

The minimum requirements are (relevant and project aligned experience not less than 4 years in respective field):

- Experience in undertaking techno-socioeconomic analysis within the electric transportation sector
- Qualitative and quantitative analysis, extensive modelling expertise
- Power sector infrastructure technoeconomic analysis

9. Available Budget

- The total budget for the workstream is \$20,000
- Contracts are to be issued on a fixed fee basis

Please take into consideration: ZEMIA is prepared to supplement any budget necessary for organizing workshops to disseminate findings and for conducting capacity-building or awareness-raising initiatives. Should such activities be deemed necessary, applicants should specify the anticipated costs along with the reasoning behind these costs. Costs linked to surveys will not be covered by ZEMIA as a supplementary cost.

10. Application:

To apply, please follow the instructions below:

1. Send your expression of interest to zambiaemobilize@zemias.org no later than **11th September at 5pm CAT**.
2. Alongside your expression of interest, interested consultants or experts must provide supporting documentation. This may include, but is not limited to, resumes of the project implementation team and evidence of previously undertaken similar or relevant research projects.



3. Please ensure that you submit three separate files, as outlined below:
 - i. **Expression of Interest:** This document should be signed and initialed on each page, and presented in PDF format.
 - ii. **Filled Application Form:** Complete the application form, sign it, and submit it in PDF format.
 - iii. **Support Documents:** Combine all relevant supporting documents into a single PDF file.

Please be aware that late submissions will not be taken into consideration. Under no circumstances will extensions be granted.

Your adherence to these application guidelines is greatly appreciated.

11. Selection Process:

Upon successful application, the following steps will ensue:

- i. **Project Kick-Off Meeting:** A project kick-off meeting will be convened, providing the potential successful candidates with the opportunity to delve into project details. Scheduled shortly after project inception/launch, this meeting will facilitate a discussion around your expression of interest and your proposed approach for effective project delivery. You will need to demonstrate to ZEMIA that your chosen methodology is likely to yield the desired outcomes. ZEMIA reserves the right to request reasonable modifications to the project plan.
- ii. **Work Package Delivery Agreement:** A work package delivery contractual agreement will be sent to you. It is mandatory that you review, sign, and promptly return this agreement.
- iii. **Additional Financial Documentation:** If requested, any supplementary financial documentation should be diligently completed and returned within the stipulated timelines.
- iv. **Project Cost Review:** A thorough examination of your project cost plan and breakdown will be conducted to ensure alignment with the principle of value for money.
- v. **Queries and Clarifications:** Should you have inquiries regarding the terms of reference, project particulars, or financial matters, please direct these to the provided ZEMIA project email: zambiaemobilize@zemia.org.

These steps collectively constitute the process following the successful selection of your application. Your cooperation in adhering to these procedures is greatly valued.

12. Financial Arrangement:

Compensation for successful projects will be disbursed as outlined below:



- An initial payment of 20% will be made upon the signing of the contract.
- 30% will be released upon submission of Deliverables 1-5.
- 30% will be released upon submission of Deliverables 6 and 7.
- The final disbursement of 20% will be made upon completion of Deliverable 10.

Please take note that when submitting invoices to the Zambian Electric Mobility Innovation Alliance (ZEMIA), the stated amount must be expressed in United States Dollars (USD). Additionally, include pertinent details of the designated bank account for the transfer. Should your account be unable to accept USD, please be aware that conversion costs may apply.

Your comprehension and adherence to these financial procedures are greatly valued.

13. Project Reporting:

Throughout the project, you will be required to adhere to the following reporting guidelines:

- Regular Progress Updates:** Regular updates must be provided to showcase the alignment of progress with the anticipated milestones of the work package. A milestone reporting document will be disseminated by the project's commencement date. Expectation includes two reporting stages.
- Final Project Completion Reporting:** Following the conclusive completion of the project, you must complete a final reporting form. This form should concisely summarize the principal discoveries, outcomes, and contributions, supplementing the deliverable guide previously outlined. This final reporting should be presented in straightforward and accessible language.

It is noteworthy that the release of the grant payment hinges upon the endorsement of the final outputs, as delineated in the delivery contractual agreement. Your commitment to complying with these reporting parameters is greatly appreciated.

For any inquiries or clarifications, contact zambiaemobilize@zemias.org