GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

CEO Endorsement (CEO) entry - Medium sized Project Child – GEF - 7

Supporting Sierra Leone with the Shift to Electric Mobility

Part I: Project Information

Name of Parent Program
Global Programme to Support Countries with the Shift to Electric Mobility.

GEF ID
10273

Project Type
MSP

Type of Trust Fund
GET

CBIT/NGI
- ☐ CBIT
- ☐ NGI

Project Title
Supporting Sierra Leone with the Shift to Electric Mobility

Countries

Sierra Leone

Agency(ies)
UNEP

Other Executing Partner(s)
Environmental Protection Agency – Sierra Leone

Executing Partner Type
Government

GEF Focal Area
Climate Change

Taxonomy
Focal Areas, Climate Change, Climate Change Mitigation, Energy Efficiency, Technology Transfer, Renewable Energy, Sustainable Urban Systems and Transport, Influencing models, Demonstrate innovative approache, Transform policy and regulatory environments, Strengthen institutional capacity and decision-making, Convene multi-stakeholder alliances, Deploy innovative financial instruments, Stakeholders, Communications, Awareness Raising, Public Campaigns, Education, Behavior change, Private Sector, Individuals/Entrepreneurs, SMEs, Financial intermediaries and market facilitators, Capital providers, Large corporations, Civil Society, Non-Governmental Organization, Academia, Type of Engagement, Partnership, Information Dissemination, Consultation, Participation, Gender Equality, Gender results areas, Access to benefits and services, Participation and leadership, Gender Mainstreaming, Sex-disaggregated indicators, Beneficiaries, Gender-sensitive indicators, Capacity, Knowledge and Research, Capacity Development, Learning, Innovation, Knowledge Exchange, Knowledge Generation

Rio Markers
Climate Change Mitigation
Climate Change Mitigation 2

Climate Change Adaptation
Climate Change Adaptation 0

Submission Date
4/9/2021

Expected Implementation Start
7/1/2021

Expected Completion Date
6/30/2025

Duration
48In Months

Agency Fee($)
38,134.00

A. FOCAL/NON-FOCAL AREA ELEMENTS

Objectives/Programs	Focal Area Outcomes	Trust Fund	GEF Amount($)	Co-Fin Amount($)
CCM-1-2	Promote innovation and technology transfer for sustainable energy breakthroughs for electric drive technology and electric mobility	GET	423,716.00	1,651,600.00
		Total Project Cost($)	**423,716.00**	**1,651,600.00**

B. Project description summary

Project Objective

To mitigate GHG emissions in Sierra Leone by accelerating the introduction of electric mobility through development of legal, regulatory and institutional framework, capacity building, demonstration pilots of electric vehicles, development of business models for private sector engagement and finance schemes for upscaling and replication.

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing($)	Confirmed Co-Financing($)
Component 1. Institutionalization of low-carbon electric mobility	Technical Assistance	1. The government has established a coordinated institutional framework and endorses a gender sensitive strategy for the promotion of low-carbon electric mobility	1.1. An inter-sectorial electric mobility coordination body is established. 1.2. A gender sensitive national e-mobility strategy is developed and formally proposed. 1.3. Key stakeholders are trained in the EV Global Programme activities (national and regional workshops, trainings and thematic working groups) and awareness is raised among key stakeholders on electric mobility.	GET	86,010.00	47,900.00

Component 2. Short term barrier removal through low-carbon e-mobility demonstrations	Investment	2. Technical, financial and environmental feasibility of introducing e-mobility in the country is successfully demonstrated by developing a business case for e-kekes	2.1. A comprehensive implementation plan for electric vehicles demonstration including a low-carbon charging scheme, and a data collection framework are developed along with the reporting and analytical framework. 2.2. Demonstration vehicles and charging equipment are procured, staff trained, demonstration projects are implemented, monitored and data are collected, analysed and disseminated.	GET	141,656.00	107,900.00

Component 3. Preparation of scale-up and replication of electric mobility	Technical Assistance	3. The government adopts fiscal policies & regulations and endorses a financing scheme to accelerate introduction of electric vehicles in Sierra Leone	3.1. Fiscal policies and regulatory schemes to incentivize the uptake of electric mobility are developed and formally proposed. 3.2. Based on the demonstration project, a financing scheme including a procurement guideline and business models for the procurement of electric vehicles is developed and formally proposed.	GET	72,700.00	1,347,900.00
Component 4. Long-term environmental sustainability of low-carbon electric mobility	Technical Assistance	4. Measures are developed to ensure long-term environmental sustainability of electric mobility in Sierra Leone	4.1. A study on integration of renewable power for electric vehicle charging is carried out and formally disseminated. 4.2. A scheme for re-use, recycling and sound disposal of used electric vehicle batteries is developed and formally proposed.	GET	52,450.00	47,900.00

Monitoring and Evaluation	Monitoring and Evaluation	GET	32,400.00	
		Sub Total ($)	**385,216.00**	**1,551,600.00**
Project Management Cost (PMC)				
		GET	38,500.00	100,000.00
		Sub Total($)	**38,500.00**	**100,000.00**
		Total Project Cost($)	**423,716.00**	**1,651,600.00**

C. Sources of Co-financing for the Project by name and by type

Sources of Co-financing	Name of Co-financier	Type of Co-financing	Investment Mobilized	Amount($)
Recipient Country Government	Environmental Protection Agency – Sierra Leone	In-kind	Recurrent expenditures	191,600.00
Recipient Country Government	Ministry of Transport and Aviation	In-kind	Recurrent expenditures	50,000.00
Recipient Country Government	Ministry of Energy	In-kind	Recurrent expenditures	50,000.00
Recipient Country Government	Ministry of Energy	Public Investment	Investment mobilized	1,300,000.00
GEF Agency	UNEP	Grant	Investment mobilized	60,000.00
			Total Co-Financing($)	**1,651,600.00**

Describe how any "Investment Mobilized" was identified

Investment mobilized was identified through bilateral meetings with the potential co-financiers within the government: • Ministry of Energy (USD 1,300,000): the investment mobilized through renewable power projects implemented by Ministry of Energy of Sierra Leone is based on the share of annual power demand of an up-scaled electric 2&3 wheeler fleet on the power generation of renewable power projects, which are currently implemented, or which will be implemented during the time of the Sierra Leone E-Mobility Project. The development of renewable power generation capacity feeding into the national grid is directly contributing to the objectives of the project intervention which is to reduce greenhouse gas (GHG) emissions from the transport sector through the integration of electric mobility. Low carbon electric mobility will need the provision of low carbon footprint electricity. The identified renewable power projects will add an additional generation capacity of 56 MW add estimated costs of 62.6 million USD. It is envisaged that the fleet of electric 2&3 wheelers directly attributable to the project interventions will reach about 8,000 units by 2030. The power demand stemming from the use of these electric 2&3wheelers is estimated to account for about 2% of the annual power generation produced be the renewable power projects mentioned in the co-finance letter. This co-finance contribution in form of investment mobilized is therefore set to 2% of the total investment in renewable power projects implemented by Ministry of Energy and occurring during the project time frame 2021 to 2025, amounting to USD 1.3 million. • UNEP (USD 60,000): UNEP will mobilize a small grant of USD 60,000 through the European Commission funded Solutions Plus project (Grant Agreement number: 875041 - SOLUTIONSplus - H2020-LC-GV-2018-2019-2020/H2020-LC-GV-2019, which has started implementation January 2020). This grant is to build upon an existing project with electric vehicle demonstration activities, and to replicate lessons learnt from the Solutions Plus demonstration projects. The grant portion will be used by UNEP for the procurement of charging equipment and for targeted support of local innovators to install and/or operate that equipment.

D. Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)
UNEP	GET	Sierra Leone	Climate Change	CC STAR Allocation	423,716	38,134
				Total Grant Resources($)	**423,716.00**	**38,134.00**

E. Non Grant Instrument

NON-GRANT INSTRUMENT at CEO Endorsement

Includes Non grant instruments? **No**

Includes reflow to GEF? **No**

F. Project Preparation Grant (PPG)

PPG Required ☐

PPG Amount ($)

35,000

PPG Agency Fee ($)

3,150

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount($)	Fee($)
UNEP	GET	Sierra Leone	Climate Change	CC STAR Allocation	35,000	3,150
				Total Project Costs($)	**35,000.00**	**3,150.00**

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)	0	116422	0	0
Expected metric tons of CO_2e (indirect)	0	271162	0	0

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)				
Expected metric tons of CO_2e (indirect)				
Anticipated start year of accounting				
Duration of accounting				

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

Total Target Benefit	(At PIF)	(At CEO Endorsement)	(Achieved at MTR)	(Achieved at TE)
Expected metric tons of CO_2e (direct)		116,422		
Expected metric tons of CO_2e (indirect)		271,162		
Anticipated start year of accounting		2021		
Duration of accounting		15		

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Total Target Benefit	Energy (MJ) (At PIF)	Energy (MJ) (At CEO Endorsement)	Energy (MJ) (Achieved at MTR)	Energy (MJ) (Achieved at TE)
Target Energy Saved (MJ)		1,283,514,453		

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

Technology	Capacity (MW) (Expected at PIF)	Capacity (MW) (Expected at CEO Endorsement)	Capacity (MW) (Achieved at MTR)	Capacity (MW) (Achieved at TE)

Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female		477		
Male		738		
Total	0	1215	0	0

Part II. Project Justification

1a. Project Description

1a. Changes in project design

Describe any changes in alignment with the project design with the original child project concept note (i.e. changes in component, outcome or output wording, changes in GEF funds allocation per component/outcome, changes in co-finance commitments and allocation per component/outcome, etc.).

While the concept targeted the demonstration of electric cars, motorcycles and 3 wheelers, the final project aims for the demonstration of about 15 electric 3-wheeler taxis alongside the necessary charging infrastructure. The focus on a limited number of demonstration vehicles is due to limited project resources as well as limited financial capacity of private sector project stakeholders to invest in new vehicles. It helps also to provide a critical threshold of vehicles to ensure ongoing and sustainable operation and maintenance.

The concept initially outlined three components: 1) Institutionalization of electric mobility in Sierra Leone; 2.) Demonstration project; 3) Preparation of scale-up and replication of electric mobility. The final project has four components, to better align with the standard component structure of the e-mobility programme: 1) Institutionalization of low-carbon electric mobility; 2) Short term barrier removal through low-carbon e-mobility demonstrations; 3) Preparation of scale-up and replication of electric mobility; and 4) Long-term environmental sustainability of low-carbon electric mobility.

As for the co-finance budget, the initial plan was to mobilize USD 2,266,000 of co-finance including in-kind support from EPA-SL, investment from Solar Park Freetown Project, the International Renewable Energy Agency, the Abu Dhabi Fund for Development, and equity investment from the private sector. At CEO Endorsement stage, this situation has evolved and the project has now secured a total co-finance of USD 1,651,600, including in-kind contributions from the EPA-SL (USD 191,600), public investment and in-kind contributions from the Ministry of Energy (USD 1,350,000), in-kind contributions from the Ministry of Transport and Aviation (USD 50,000) and finally a grant from UNEP (USD 60,000).

The budget allocations across components have been made to ensure that the project can deliver on the necessary set-up of an institutional framework, the development of adequate policy measures and the establishment of viable business cases. This enhances the potential for catalytic impact of the project and strengthens project sustainability.

1b. Project Description

1) Global environmental and/or adaptation problems, root causes and barriers that need to be addressed

Global environmental problem:

A global transition to low- and zero-emissions mobility is essential to meeting international climate commitments, including the Paris Climate Agreement. The transport sector is currently responsible for approximately one-quarter of energy-related carbon dioxide emissions[1], this is expected to grow to one-third by 2050, faster than any other sector. In addition, the transport sector is a leading contributor to short-lived climate pollution, especially black carbon which can warm the Earth faster compared to carbon dioxide

The global vehicle fleet is set to double by 2050, and almost all this growth will take place in low- and middle-income countries[2]. By 2050 two out of three cars will be found in developing countries. This means that achieving global climate targets will require a shift to zero-emissions mobility in all countries, including low- and middle-income ones.

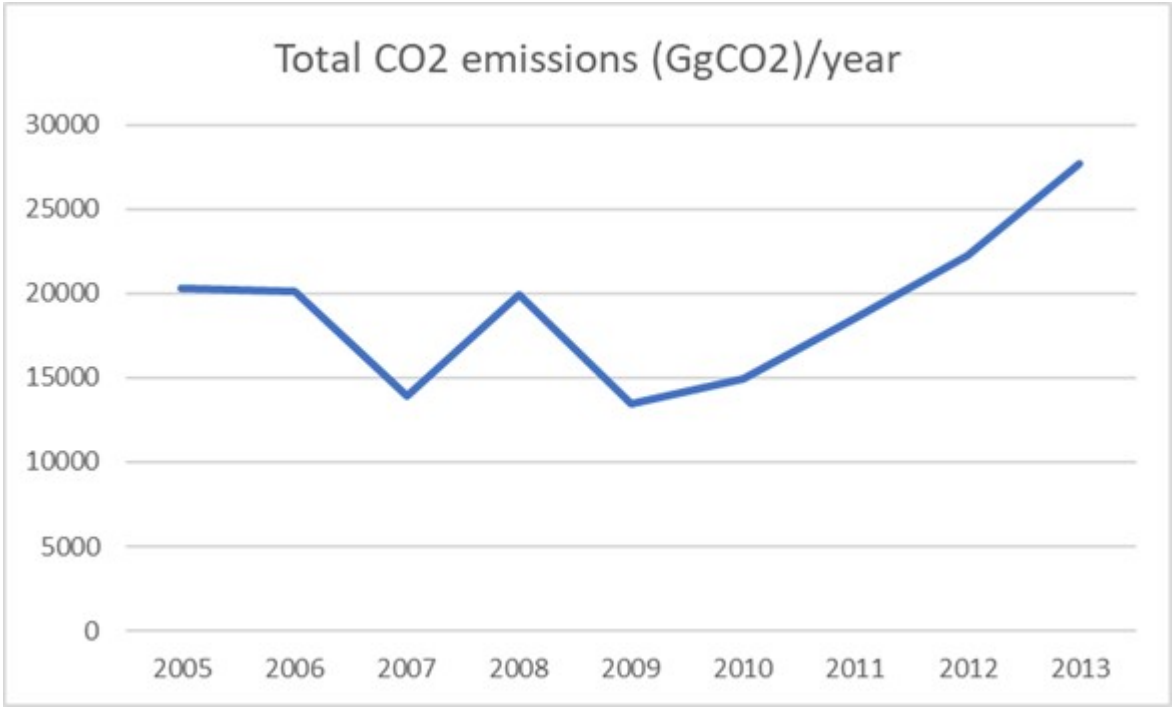

Figure 1 TOTAL CO2 EMISSIONS

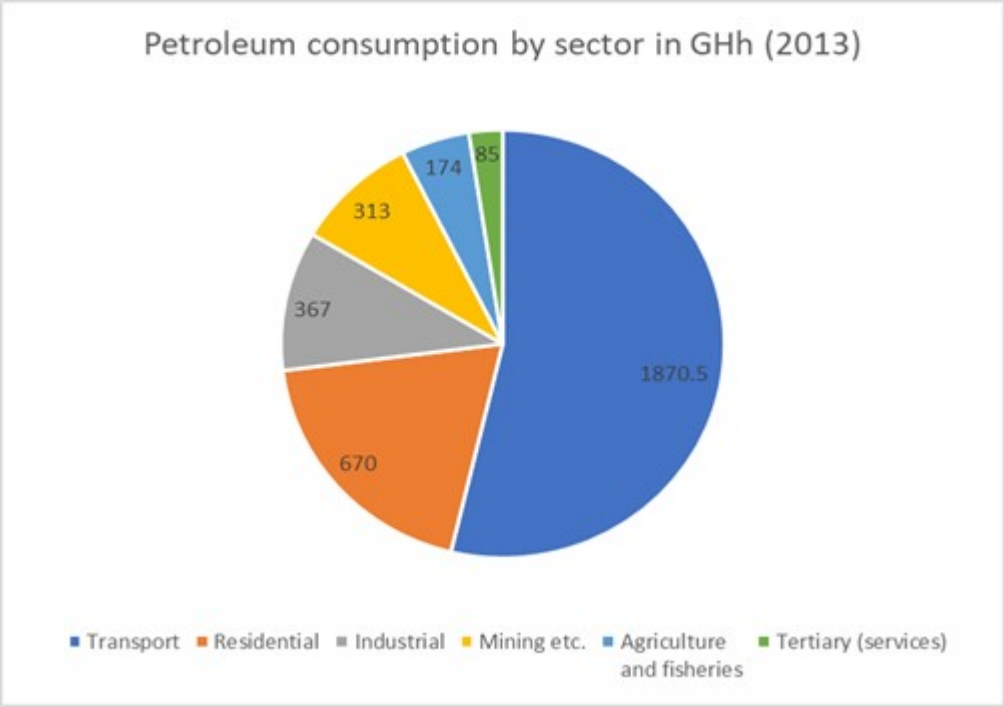

Figure 2 PETROLEUM CONSUMPTION BY SECTOR

Since 2009, total CO_2 emissions grew substantially (Figure 1[3]) and there is a high potential to reduce greenhouse gas (GHG) emissions in Sierra Leone's transport sector. While there is no reliable data on the country's GHG emissions broken down by sector, transport is the single biggest user of petroleum in the country (Figure 2[4]) and it is the fastest-growing energy demand sector. As Sierra Leone intends to maintain its emission levels to be relatively low by 2035 or to achieve carbon-neutral by 2050 according to their Intended Nationally Determined Contribution (INDC), significant improvements in energy efficiency should be made in the transport sector.

In addition, the transport sector is expected to account for a large share of urban air pollution as motorization and urbanization continue to rise. Between 2002 and 2014, the vehicle fleet in Sierra Leone more than tripled (Figure 3[5]), with the largest growth coming from 2&3-wheelers growing by a factor of 12 to hit 19,969 in 2013. As of 2019, there were 403,264 vehicles on the road, of which 8,162 were taxis, according to Sierra Leone Road Safety Agency (SLRSA) database. All of the 2&3-wheelers are imported with most of them used as taxis, filling in the vacuum left by inadequate public transport services along with a growing number of 3-wheelers.

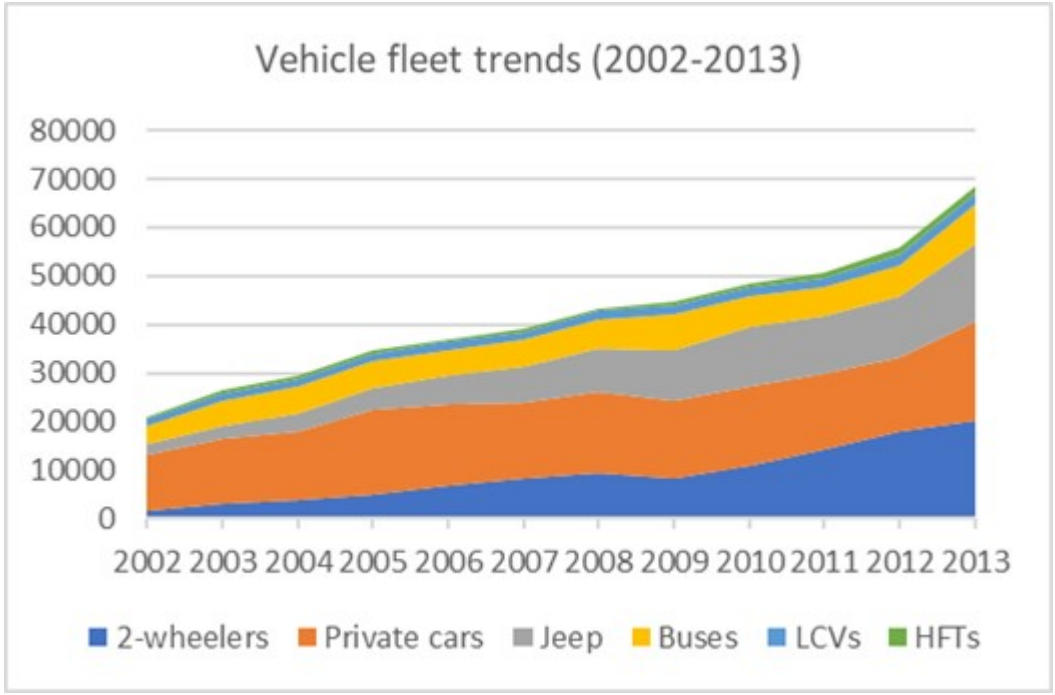

Figure 3 VEHICLE FLEET TRENDS (2002-2013)

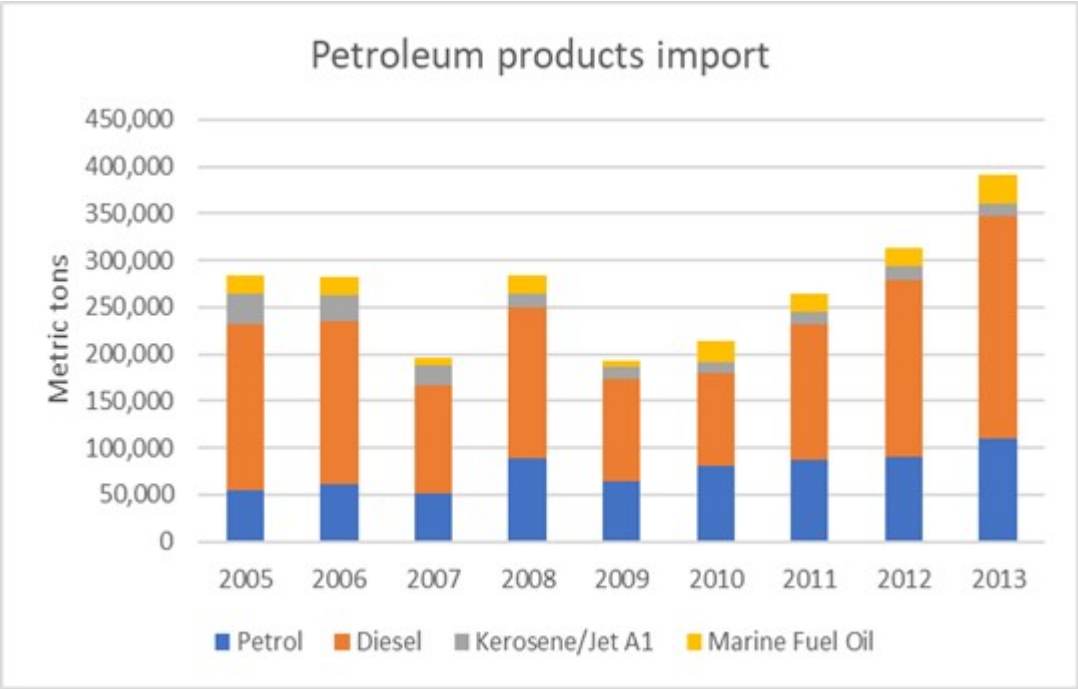

Figure 4 Petroleum products imports

The private sector is the major provider of transport services in Freetown, accounting for nearly 85 percent of the market share[6]: (a) poda-podas, which are minibuses carrying approximately up to 15 passengers, are often not professionally driven or adequately maintained, and circumvent fare regulations (passenger demand share 28 percent); (b) shared taxis (passenger demand share 27 percent); (c) Okadas, which are two-wheel motorcycles (passenger demand share 16 percent); and (d) kekes, which are three-wheel auto-rickshaws (passenger demand share 14 percent).

With no indigenous sources of coal or natural gas, Sierra Leone's reliance on imported energy is high. The majority of Sierra Leone's population relies on inefficient, polluting conventional fuels. At the same time, imports of petrol and diesel in Sierra Leone increased by 38 percent and 136 percent respectively between 2010 and 2013 (Figure 4[7]). Sierra Leone depends mainly on petroleum products (petrol, diesel, liquid petroleum gas, kerosene, and heavy fuel oil) and fuelwood) for its sources of energy.

This upward trend in petroleum fuel imports is projected to grow unless adequate intervention is made, which will lead to increased CO_2 emissions and deteriorating air quality.

In 2015, the total production of electricity was 28 ktoe of which 46.4 percent came from fossil fuels and 42.8 percent from hydro sources[8]. Given that most of the fossil fuel power generation in Sierra Leone is based on the use of heavy fuel oil burned in diesel generator sets, the overall carbon footprint of power in Sierra Leone is estimated to be around 450 gCO_2/kWh. Based on this and with ongoing investments in renewables in the country, the use of grid electricity in transport applications immediately generates GHG and air pollutant emission reduction. Therefore, the project aims to support Sierra Leone in introducing electric vehicles in passenger transport fleets by decoupling increased mobility needs from increased CO_2 emissions and fossil fuel imports.

Root causes:

The transport sector is a key to economic recovery that is much needed for Sierra Leone, which has suffered severely from the Ebola outbreak 2014-2015 and the civil war 1991-2002. The lack of basic infrastructure and the influx of large amounts of old and polluting vehicles are compounded by a lack of regulations and institutional capacity. A World Bank report[9] investigated the impact of Freetown City on the national economy and found out that more than 30% of Sierra Leone's GDP is generated in the city. Against this background, urban transportation in Freetown has a significant contribution to the national economy.

In order to successfully transition to a low-emissions pathway through electric mobility, a number of barriers need to be addressed in Sierra Leone: 1) Lack of information and awareness; 2) Policy and planning barrier 3) Institutional capacity barrier; 4) Financial barriers, and 5) Technical barriers.

1. **Lack of information and awareness –** In Sierra Leone, the concept of electric mobility is not well understood and cheaper vehicles are preferred, irrespective of fuel economy and total cost of ownership. In many middle and low-income countries, low-emissions transport is still perceived as an expensive technology that is not suitable for local conditions. At the same time, the short- and long-term benefits of using low-emission vehicles, like reduced energy use, CO_2 and air pollutant emissions are often overshadowed.

2. **Policy and planning barrier –** The development and implementation of policies to foster the uptake of low-emission mobility most often includes stakeholders from various ministries and marginalised groups and requires thorough analysis and understanding of the national transport sector. There is a range of policy options to incentivise low-emissions vehicles and a tailored set of interventions needs to be developed based on the local context. Currently, the transport sector policies and regulations of Sierra Leone are largely based on internal combustion vehicles and there is no national policy in place to guide the transition to low-emission transport. Although an Integrated Transport Policy, Strategy and Investment Plan was developed in 2013, implementation was stalled through the 2014 to 2016 Ebola Pandemic. The 2013 strategy has a focus on road infrastructure, international connectivity and improving urban mobility, among others. However, the strategy has very little content on energy efficiency in the transport sector and how to address the increasing fleet of vehicles coming hand in hand with increased energy use, GHG and air pollutant emissions and fuel expenditures[10].

3. **Institutional capacity barrier –** At present, the public transport sector in the country's capital is largely inefficient and unreliable. Lack of capacity to put in place strategies and agreements to enable the provision of sustained public transport services is a root cause to prevent systematic development of the transport sector in Sierra Leone. For example, recently the government had to stop operating a newly purchased fleet of 50 school buses, which

was to ferry children to schools. Soon after the launch of the service, Districts and City Councils could not sustain the prohibitively high costs to operate the fleet including fuels and drivers. As a result, the service could not be sustained although the initiative was very much appreciated by the public.

4. **Financial barrier** – The low purchasing power of Sierra Leone is a key obstacle to harnessing both – electric mobility and the countries' natural resources, even though there is a great potential for integrating them with cleaner and more efficient mobility. Since a large share of the population lives below the national poverty line, the proliferation of cheaper and polluting vehicles with low technological standards and shorter lifespan persists. Although the gap is closing, the purchase of electric vehicles is still more expensive than their internal combustion engine (ICE) counterparts and thus even less affordable than other vehicles. This situation is made even more impeded by preventatively high-interest rates for consumer loans, well above 20% on average and often close to 30%. This is an impediment adding to the already existing lack of interest from the private sector on electric mobility. This conundrum leads to little or no availability of e-mobility products in the local market, preventing stakeholders from considering cleaner and more efficient vehicles.

5. **Technical barrier** - Lack of expertise in procurement, operation and maintenance of electric vehicles in fleets poses another challenge. This is true for both publicly and privately operated vehicle fleets, including two- and three-wheelers, cars, and buses. Unstable availability of relevant auto parts as a persistent problem with even combustion engine vehicles throughout the country only compounds this technical barrier.

2) Baseline scenario and any associated baseline projects

Current institutional, regulatory, and fiscal frameworks for the transport and energy sector

Key stakeholders when it comes to the introduction of e-mobility in Sierra Leone are the Environmental Protection Agency – Sierra Leone (EPA-SL), responsible for air pollution and climate change policies, the Ministry of Transport and Aviation (MoTA), with overall responsibility for transport policy and planning; the Ministry of Energy which oversees the country's energy supply and planning, the Sierra Leone Road Safety Authority (SLRSA), responsible for vehicle registrations, and traffic management; the Freetown City Council (FCC), responsible for the management of parking; and the Sierra Leone Police, responsible for controlling operations and enforcing regulations.

The Government of Sierra Leone recognizes that the high-level of dependence on imported fossil fuel poses several challenges in the transition to a low emissions pathway that would reduce GHG emissions and air pollution in the country. In its INDC, Sierra Leone indicates its intention to maintain its emissions levels below 7.58 $MtCO_2e$ by 2035 and to be carbon neutral by 2050. Since both power generation and the transport sector largely depend on the importation of fossil fuels, international petroleum prices have a great impact on local prices and inflation. Since the volatility of international petroleum fuel price is partly buffered by the government through adjustment of taxes, it has a direct bearing on the national accounts.

Item		Cost (SLL)
Car	New Registration	610,000
	Renewal	245,000
Taxi	New Registration	680,000
	Renewal	400,000
Commercial Bike	New Registration	505,000
	Renewal	265,000
Private Bike	New Registration	515,000
	Renewal	250,000
Jeep	New Registration	690,000
	Renewal	290,000
Insurance	This varies by the cubic capacity of the vehicle engine and use	80,000-100,000

Table 1 Costs of vehicle registration (source: SLRSA)

However, the transport policies and regulations of Sierra Leone are still predominantly based on internal combustion vehicles with no national policies to promote low-emission transport. The Integrated Transport Policy, Strategy and Investment Plan (2013) does not feature issues of energy efficiency, GHG and air pollutant emissions and fuel expenditures[11] in the transport sector.

Local policies on vehicles and spare parts require that all vehicles in Sierra Leone, irrespective of their fuel type, must have a roadworthiness certificate, an auto insurance certificate, and a number plate and are subject to valued road taxes to be allowed to be driven on public highways. Table 1 shows the costs of registration for various vehicle categories. This is a standard requirement for all users of vehicles. Currently, there is no difference in licencing fees for all engine sizes and vehicle capacity with new vehicle classification to be introduced in 2020. The vehicle registration process in Sierra Leone, managed by the Sierra Leone Road Safety Authority (SLRSA), is outlined in Figure 5 below.

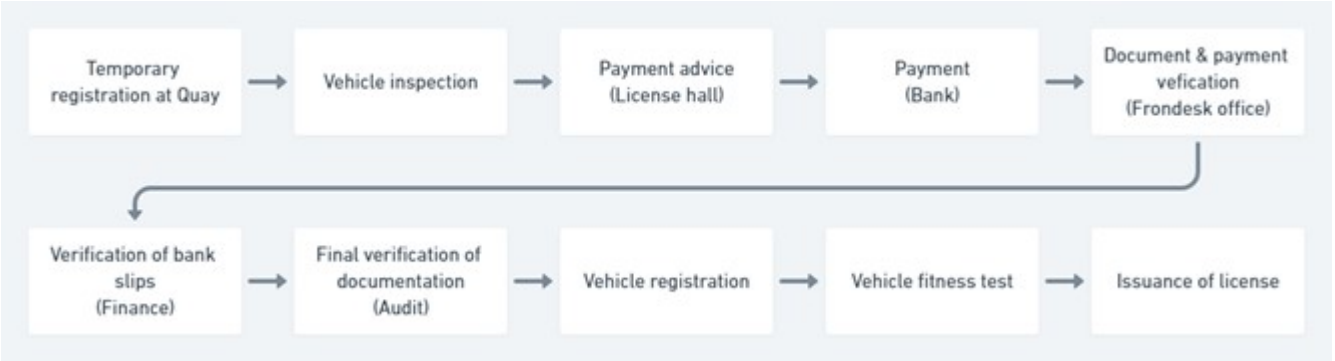

Figure 5 Vehicle Registration process (Source: SLRSA)

Sierra Leone has no age limitation on used imported vehicles. Customs department levies import duties on used vehicles depending on their age. Vehicles older than ten years are subject to a thirty percent duty on the value of the car while those that range between four to ten years old are charged with a twenty percent import duty. Vehicles of up to four years old are imposed an import duty of five percent on the car value. Thus, the importation of very old vehicles to Sierra Leone is disincentivized through significantly higher taxation but there are no measures in place to support the purchase of energy-efficient vehicles.

Currently, the existing institutional framework for urban transport management in Freetown is restricted by overlapping and ambiguous mandates and the lack of a formal mechanism for coordination. This is compounded by the cross-cutting nature of electric mobility that requires multiple sectors to work together, including transport, energy, industry, and environment. Hence the introduction of electric mobility could be achieved only by establishing a formal coordination mechanism.

When it comes to the energy policy, the Government of Sierra Leone's Energy Sector Strategy aims to 1) raise the rate of access of population to power; and 2) increase the availability of reliable and sustainable power in the country. By 2018, 339 MW of power generation have been installed in the country (of which about half is from renewable sources of energy, see section 1) and the shortfall of power capacity is estimated to be about 800MW (http://energy.gov.sl/Energy_Taskforce.html), which is partly bridged by captive generation (industry) diesel generators (residential). Access rate of population to grid electricity is estimated to be only around 23%[12]. The increased availability will need to come from more diversified power sources to achieve an energy mix that can offer affordable tariffs, which is shown in a number of legislative, regulatory, structural and infrastructural improvements albeit at a slow pace. Currently, the electricity tariff regime is heavily subsidised and amounts to USD 0.28 /kWh [13]. The government has ambitious plans to increase power supply.

The regulatory framework is conducive to investment in the energy sector, despite the persisting challenges with staff capacity and weak coordination across the involved entities. With the National Electricity Act (2011), the power sector in Sierra Leone is prepared for the integration of renewable power from independent power producers, as power generation (Electricity Generation and Transmission Company, EGTC) has been unbundled from power distribution (Electricity Distribution and Supply Authority, EDSA). EGTC deals with generation and transmission at high voltage levels whilst EDSA is in charge of sub-

transmission at 33 kV and electricity distribution (WB, PAD2897, 2019). The power sector operates under a “single-buyer” model, which requires power produced to be sold to EGTC. The National Electricity Act establishes a basis for power purchase agreements between relevant parties. The unbundling was further supported by the Electricity and Water Regulatory Commission (EWRC), an independent regulator.

Sierra Leone, in its National Renewable Energy Action Plan[14] states a target of 65.3% renewable energy share of the total installed capacity, including medium and large hydro, for the year 2030 (compared to the baseline shares of 57.8% in 2010 and 52.3 % in 2020).

Related baseline projects

Numerous projects aiming at improving the transportation sector and to increase hydropower and solar power generation in Sierra Leone are under development. The below table summarises the related baseline projects happening in Sierra Leone:

Sector	Project title	Project activities	Implementing and funding entities	Budget
Transport	Integrated and Resilient Urban Mobility Project (IRUMP)	• Modernization and professionalization of transport services • Strategic resilient mobility investments (public transport) • Building human capital	The Ministry of Transport / Aviation World Bank	$52 million
Energy	Solar Park Freetown Project	• Support the energy sector in the country through building a 6 MW solar power plant in the city of Freetown. • Extension of the 161KV grid power line, a distribution substation, and a MV/HV substation	Ministry of Energy / International Renewable Energy Agency & Abu Dhabi Fund for Development	$12.6 million
Energy	Rural Renewable Energy Project	• Installation of solar power in community health centres, was completed in July 2017. • The second phase is focusing on providing access to electricity to houses, schools and businesses in 50 rural villages, by expanding the existing health centre solar power stations, and installing distribution networks to create 50 independent mini-grids	UNOPS, UK Department for International Development	£34.5 million
Energy	Enhancing Sierra Leone Energy Access	• Electrification of towns and communities through grid extension • Electrification through mini-grid and standalone solar systems • Human capital development and project implementation support	Ministry of Energy, Electricity Distribution and Supply Authority, Ministry of Finance / World Bank	$52.70 million

First and foremost, Sierra Leone is currently developing an Integrated and Resilient Urban Mobility Project (IRUMP) funded by the International Development Association (IDA) of the World Bank (WB), approved in June 2019. The project has a total volume of USD 52 million, including an IDA grant of USD 50 million, which will be mainly used to for the 1) modernization and professionalization of transport services, 2) strategic resilient mobility investments and 3) building human capital (WB, PAD2711, May 2019). The IRUMP is being implemented by Ministry of Transport and Aviation (MoTA). MoTA will be part of the Project Steering Committee and is envisaged to play a substantial role during project implementation. Extensive discussions took place between EPA-SL, the World Bank and the Ministry of Transport and Aviation on collaborating to seek synergies between the IRUMP and the Sierra Leone E-Mobility Project, especially as it relates to capacity building. Under IRUMP's component 1, "modernization and professionalization of transport services", IRUMP is focusing on the formalization of the informal transit in Freetown. Relevant stakeholders united in the Steering Committee chaired by MoTA and the Freetown City Council and including SLRSA, the Sierra Leone Road Transport Corporation (SLRTC), the traffic police, the Transport Union, the Traders Union and the Passenger's Welfare Association[15]. The GEF project will reach out to the IRUMP Steering Committee to include electric mobility and in particular e-kekes as part of the Transit Reform Approach, which is based on three pillars, namely routes, infrastructure and vehicles. While the IRUMP is much focusing on developing a scheduled bus system in Freetown, it will need to consider the integration of passenger transport through last-mile connectivity routes using motorcycle and 3-wheeler taxis.

On the energy side, the Ministry of Energy's pipeline will bring up to 156 MW installed capacity, of which 56 MW are renewable power projects (solar PV) and up to 100 MW are based on ship-based heavy fuel oil (HFO) power generation. The HFO based power supply is considered a short to medium-term solution to rapidly address the shortage in power generation capacity and shall be implemented in 3 one-year expansion steps of approximately 30 MW each. Costs are still unclear, and it remains to be seen whether this additional non-sustainable power generation capacity will indeed go on-line. This added HFO power generation capacity is contradictory to the vision to "make Sierra Leone Africa's first Zero-Carbon middle-income economy by 2040".

Solar radiation in the country averages between 1,460 - 2,200 kWh/m, which is suitable for exploitation [16]. There are upcoming investments implemented by Ministry of Energy such as the USD 12.6 million Solar Park Freetown Project that will generate about 6 MW of power. In addition, a USD 52.7 million project funded by World Bank and implemented by the Ministry of Energy and EDSA is planning to install mini-grid and standalone solar systems in rural Sierra Leone, which will further increase the share of renewable energy in the national power generation mix and will allow the integration of renewables to e-mobility.

United Nations Office for Project Services (UNOPS) is currently implementing a £34.5 million "Rural Renewable Energy Project", which is funded by the UK Department for International Development (DFID)[17]. The project will be completed in several phases over a period of four years. The first phase targeting the installation of solar power in community health centres, was completed in July 2017. The second phase is focusing on providing access to electricity to houses, schools and businesses in 50 rural villages, by expanding the existing health centre solar power stations, and installing distribution networks to create 50 independent mini-grids (at around 30-49kW each).

In addition to the ongoing or approved solar PV projects, additional utility-scale solar power projects are in the pipeline in Bo, Fourah Bay and at Njala. Smaller-scale developments such as solar-powered street lights in rural communities involve the development of 50,000 solar-powered street lights across all 190 chiefdoms (https://www.investinginsierraleone.com/energy/).

Sierra Leone still has significant additional hydropower potential. The Bumbuna dam on the Seli River is currently the largest hydropower dam with a peak capacity of 50 MW and government is planning an expansion by 143 MW. In addition to the expansion of the Bumbuna plant, the government has identified up to 27 hydropower sites suitable for development*, 2017), with a total anticipated capacity of 1,513 MW. These include a large-scale hydro plant at Bikongor with a potential capacity of up to 200 MW and other mini-hydro plants, which are expected to be a means of widening access to power in Sierra Leone

Depending on the inclusion of new HFO power generation capacity and the feasibility of the envisaged large scale hydro projects, the future carbon footprint of Sierra Leone's grid power mix will range between today's level of about 450 gCO2/kWh and a value below 200 gCO2/kWh. In any case, even at today's carbon footprint of 450 gCO2/kWh, the use of electric vehicles would result in immediate CO2 and air pollutant emission reductions. The Ministry of Energy, which is responsible for the implementation of the outlined baseline projects, will be part of the Project Steering Committee and will play an active role in the execution of the Sierra Leone E-Mobility project. A part of the currently adopted public investment into 56 MW solar PV generation capacity will contribute as co-finance to the outcomes and overall objective of the project[18].

The introduction of electric 2&3-wheelers, which have battery capacities of 4 to 6 kWh and could be directly charged by low voltage and direct current produced by solar panels (and without the need for expensive transformers and inverters) provides the opportunity to seek synergies with projects aiming at the installation of rural, solar mini-grids. The batteries used in electric 2&3-wheelers could also be used for power storage for other applications when integrated into solar rural mini-grids.

Baseline projections for keke sales, fleet energy use and emissions

As the latest addition to Sierra Leone's passenger transport, kekes are responsible for a significant share of passenger transport. For example, in Freetown, kekes account for 14 percent of the passenger demand share (World Bank, 2018). That share relates to 16 percent of passenger transport being done with motorcycle taxis, 27 percent relying on shared taxis and 28 percent using minibuses seating up to 15 passengers. In general, kekes are a relatively new but quickly growing as a mode of passenger transport. Compared to motorcycle taxis which were banned in Freetown CBD, the Sierra Leone Road Safety Authority is more in favour of 3-wheeled taxis. This is because the kekes' speeds are lower and the dimensions of the vehicle force drivers to flow with the existing traffic rather than using sidewalks etc. to overtake. Being a major employer of local youths along with 2-wheelers, kekes hold a niche in the road transport sector as a new player and are often considered safer and more comfortable than motorcycles whose drivers and unions often clash with the police and officials over traffic laws.

Currently, the supply of kekes relies on models from three brands: 1) Bajaj; 2) TVS; and 3) Piaggio. They are all based on gasoline engines. Each of the different 3 wheelers have different advantages and drawbacks. For example, the model from Piaggio is more powerful and can climb steeper gradients at higher speeds, but it is also considered to be less fuel-efficient. Also, the supply with spare parts is considered more complicated as only a couple of importers are located in the centre of Freetown. Therefore, according to discussions with local experts, Bajaj and TVS have a much higher market share than Piaggio.

Based on motorcycle taxi data provided by Statistics Sierra Leone (2013 Transport Sector Bulletin) and own estimates with regards to growth of sales and stock as a function of GDP per capita, estimates for the historic and future sales and stock of 2&3-wheelers, including keke, have been developed. Therefore, it is assumed that kekes account for 25 percent of the combined keke and okada (motorcycle taxis) fleet reported by Statistics Sierra Leone. The total fleet of 2&3-wheelers in 2020 is estimated to comprise about 40,000 vehicles, 9,000 of which are kekes. It is assumed that the fleet of 2&3-wheeler taxis will grow to about 80,000 vehicles in 2030 and about 140,000 vehicles by 2050 (Figure 6). Based on local information, it is estimated that 2&3-wheeler taxis are used for about 100 km per day on 6 days per week for 48 weeks per year. In total this leads to high annual distances driven of about 28,800 km per 2&3-wheeler taxi per year. Given that these vehicles consume about 3.5 to 5 litres of gasoline per 100 km, the energy use of motorcycle taxis and keke in Sierra Leone is substantial. It is estimated, that today 2&3-wheelers account for the use of almost 55 million litres of gasoline per year, emitting about 150,000 tons of CO_2. Given the anticipated growth trajectory, emissions are envisaged to double by 2032 and to more than triple by 2050 (cf. Figure 6).

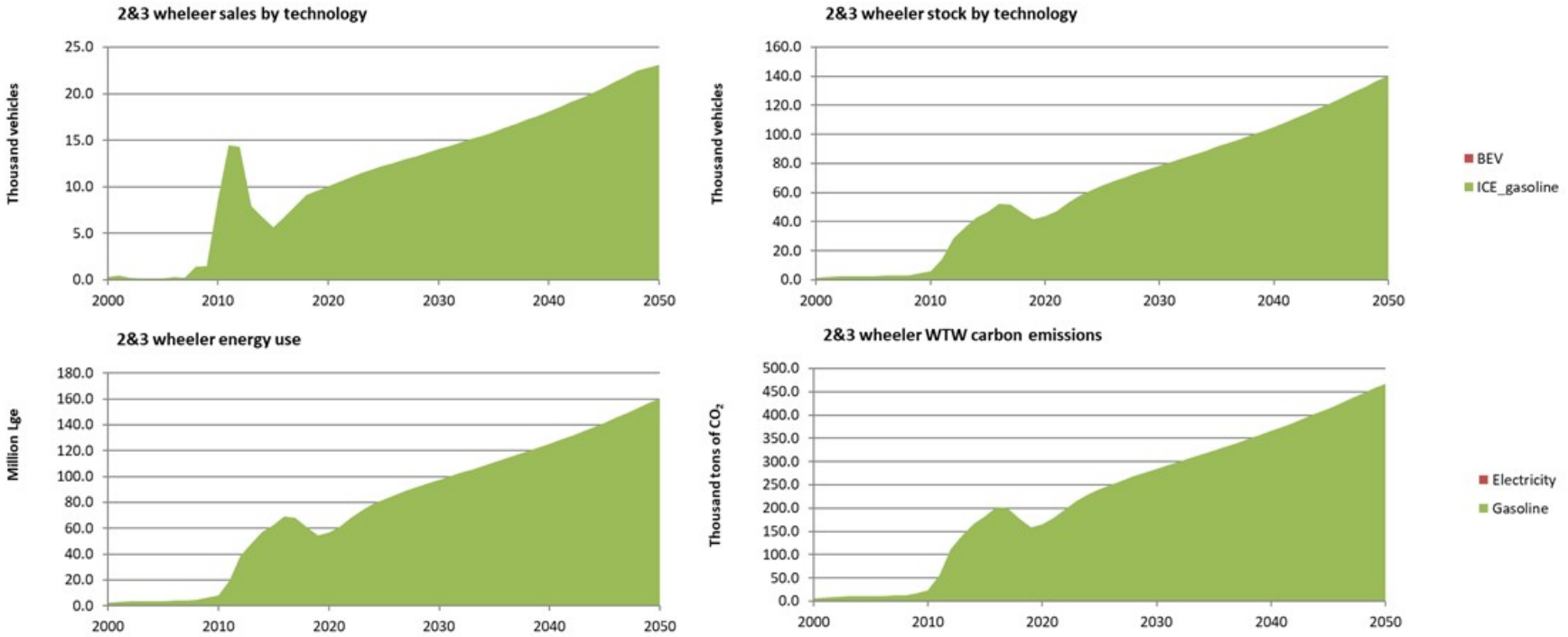

Figure 6 BASELINE SCENARIO FOR 2&3 WHEELER SALES, FLEET, ENERGY USE AND GHG EMISSIONS

3) Proposed alternative scenario with a description of project components, outcomes, outputs and deliverables

The objective of the electric mobility project is to lay the ground for the successful introduction of electric mobility in Sierra Leone. This comprises building the necessary administrative structures, the development of capacity among key decision-makers, and the provision of a coherent strategy. This includes for example the coordination between Ministry of Transport and Aviation, which is responsible for the implementation of mobility projects such as the World Bank IRUMP, and the Ministry of Energy, which is leading the implementation of renewable power projects, among others, such as the Ministry of Environment and the Freetown City Council. Furthermore, most stakeholders so far have very little experience with e-mobility. Therefore, to facilitate the implementation of the project, staff of relevant Ministries and city partners will be trained on issuers related to e-mobility and a Project Steering Committee comprising focal points from (but not limited to) the Executing Agency from EPA-SL, the Ministry of Transport and Aviation, the Ministry of Energy, the Ministry of Environment, the Ministry of Industry and Trade, the Ministry of Finance and Freetown City Council (among others) will be established. It is proposed that this Committee will evolve into an inter-sectorial electric mobility coordination body (Output 1.1). Once fully established, the coordination body will ensure that all relevant stakeholders approach the introduction of e-mobility in a coordinated and cooperative manner, which can inform on e-mobility regulation and policy and support the local private sector with the set-up of e-mobility businesses. The development of the gender-sensitive national e-mobility strategy will build on the analysis of the current policy framework for the transport and the energy sector and will be guided by the e-mobility coordination body. Policy gaps will be identified in order to propose adequate measures to fill these gaps and to incentivize the uptake of the e-mobility market.

The project focuses on the introduction of electric 3-wheelers (keke) used as taxis.

In the context of Sierra Leone, the electrification of kekes presents a great potential to mitigate CO_2 emissions, reduce energy use and associated costs, and to reduce air pollution and associated negative impact on health in Sierra Leone. As described above, the electrification of kekes has the potential to substantially contribute to lower energy use, GHG and air pollutant emissions. This is especially true given the very low carbon footprint of the power mix in Sierra Leone, which relies heavily on hydropower, and which increasingly depends on the expansion of other renewable power generation such as solar and wind. With the high growth rate of kekes of about 20% per year (WB, PAD2711, May 2019), the introduction of electric kekes is a very timely intervention with a high GHG mitigation potential It is part of the project to develop the right financial products and business models to develop a convincing business case for keke drivers and fleet operators to shift to electric kekes.

The project will collaborate extensively with private sector partners, as the private sector is the major provider of transport services in Freetown, accounting for about 85% of the mobility needs of Freetown citizens (World Bank, 2019). Recognising the economic and environmental benefits of electrification, some private sector stakeholders in the 3-wheeler sector have already identified electric kekes as part of their business models. One such company is a local ride-hailing service start-up that is investigating the use of electric kekes as part of their existing ICE fleet.

Component 3 aims at developing long-term strategies to scale up electric mobility in Sierra Leone. Building on the gap analysis, working towards the objectives formulated in the national strategy developed under Component 1 and based on experiences with the e-keke pilot under Component 2, the project will support the development of concrete policy and finance measures to incentivize the e-mobility market in Sierra Leone, which will be submitted for adoption. These measures will include:

- Procurement guidelines (e.g. technical specifications) for electric vehicles
- Business models for the procurement, operation and charging of electric vehicles in public transport fleets
- Fiscal and regulatory incentives to support the up-scaling of the e-mobility market, focusing on electric 2&3 wheelers but not being limited to these segments.
- Development of a financial mechanism to make e-kekes accessible to taxi fleet operators and individual drivers;
- Development of business models, including the charging for electric kekes to allow for a large-scale introduction of e-kekes in Freetown.

Finally, Component 4 will address issues of environmental sustainability of electric mobility in Sierra Leone, including 1) the development of an initial scheme to collect, re-use and prepare for recycling of used e-mobility batteries; and 2) a strategy on how to link the upscaling of renewable power generation, including through micro and mini-grid applications in Sierra Leone.

Component 1: Institutionalization of low-carbon electric mobility

Outcome 1: The government has established a coordinated institutional framework and endorses a gender sensitive strategy for the promotion of low-carbon electric mobility

An e-mobility coordination body comprising stakeholders from (but not limited to) the Ministry of Transport and Aviation, the Ministry of Energy, EPA-SL, the Ministry of Environment, the Ministry of Industry and Trade, the Ministry of Finance, Freetown City Council and the private sector will be established. The coordination body will be responsible to align interests of the various stakeholders with respect to: 1) Meeting the needs of creating tax revenues to incentivize the e-mobility market; 2) Alignment of electrification targets and renewable power integration with e-mobility power demand projections; 3) Development of technical guidelines and standards in alignment with the power-sector and transport sector regulation in Sierra Leone; 4) Development of gender-sensitive national e-mobility targets in coordination with local authorities such as Freetown; and 5) Promoting of a positive business environment spurring innovation in Sierra Leone. Under the guidance of the e-mobility coordination body and with support through the Global Electric Mobility Programme, its Africa Support and Investment Platform as well as local and international expertise, a gender-sensitive national strategy for the introduction and up-scaling of e-mobility in Sierra Leone will be developed. Relevant stakeholders from the government, private sector, civil society, and academia will be trained on e-mobility through the events carried out under the Africa Support and Investment Platform. The training will include a long-term strategic curriculum, starting with general aspects of electric mobility and a gradual focus on detailed issues with regards to the introduction of electric kekes as well as the various options of charging them. Training will be provided in cooperation with SOLUTIONSplus project, for which tools and knowledge products are under development since January 2020. Through this cooperation, it is ensured that that more general e-mobility trainings will be available right from the beginning of the e-mobility Country Child Projects, while more specific and targeted training will be developed as required during the first 12 months of the GEF Global Electric Mobility Programme.

Outputs:

Output 1.1: An inter-sectorial electric mobility coordination body is established.

The coordination body will be based on but not limited to the Project Steering Committee and should include representatives of all key ministries (the Ministry of Transport and Aviation, the Ministry of Energy, EPA-SL, the Ministry of Environment, the Ministry of Industry and Trade, the Ministry of Finance) as well as the local administration of Freetown. In addition, the Project Management Unit will encourage the different coordination body member institutions to appoint female representatives, with the objective of achieving the target of 30% female representation in the body, as outlined in the Gender Action Plan. The table below provides an overview of the core and additional members of the inter-sectorial electric mobility coordination body:

Type of members	Entities	Roles
Core members	Ministry of Transport and Aviation Ministry of Energy EPA-SL Ministry of Environment Ministry of Industry and Trade Ministry of Finance	Review and discuss policy proposals and ensure that positions and expertise of their respective entity is reflected Provide overall guidance for the development of the National E-Mobility Strategy. Ensure that deliverables developed under the GEF E-Mobility project will be considered by relevant stakeholders Appoint a gender focal point, to support with the work on gender mainstreaming throughout the project.
Additional members, to be confirmed during the project implementation.	Sierra Leone Road Safety Authority (SLRSA) Electricity Distribution and Supply Authority (EDSA) Sierra Leone Standards Bureau Ministry of Lands, Country Planning and the Environment Ministry of Gender and Children's Affairs Sierra Leone Road Transport Corpoeration Freetown City Council	Provide technical inputs, data and information on the existing policies as required Are consulted by the core members whenever required.
Private sector, academia and civil society	Rokel Commercial Bank Taptap Keke rider's union Fourah Bay College	Provide technical inputs, data and information as needed Are consulted by the core members whenever required.

In addition, the coordination body will request its different member Ministries to nominate a "champion" located within each Ministry, which is to be determined to act as a local help-desk to support businesses with information around e-mobility in Sierra Leone and to host a local repository for e-mobility information. The "champions" will also actively participate in the project Technical Working Groups (TWG).

Finally, the e-mobility coordination body will encourage the different Ministries to appoint a gender focal point, to support with the work on gender mainstreaming throughout the project and particularly in the national e-mobility strategy to be developed under Output 1.2.

D 1.1.1 Inter-ministerial workshops participation and report

D 1.1.2 Quarterly coordination body meetings participation and report

D 1.1.3 Selection of e-mobility champion and establishment of local data repository and e-mobility helpdesk

D 1.1.4 Final e-mobility coordination body report, including all best practices and lessons learned from the project (to be shared with the Global Electric Mobility Programme)

Note: the project has budgeted for venue and catering services for the quarterly coordination body meetings for Years 1 & 2. Beyond Year 2, it is expected that the government will have agreed on the institutionalization of the coordination body and will have allocated regular budget to it in order to ensure its functioning for Years 3 & 4 and its sustainability beyond the life of the project.

Output 1.2: A gender sensitive national e-mobility strategy is developed and formally proposed

A detailed gender sensitive national e-mobility strategy including concrete short- to long-term scenarios and targets for the electrification of the road transport in Sierra Leone will be developed under this output. The strategy will be drafted by a team of national and international experts in close coordination with the Ministries and/or authorities and be discussed in the meetings of the coordination body before its finalisation and subsequent proposal for adoption. The strategy will include targets and milestones for the electrification of all vehicle modes, with a particular focus on 2&3 wheelers. Development of targets and milestones for the penetration of electric 2&3 wheelers can be based on the scenario analysis for the calculation of Global Environmental Benefits of this project document (described in Section 6).

In addition, the national e-mobility strategy will link to the in-depth studies regarding the aligned development of e-mobility and low carbon power generation capacity in Sierra Leone (component 4, output 4.1). The strategy will furthermore link to the analysis regarding the introduction of an initial scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries in Sierra Leone (component 4, output 4.2). The strategy will provide initial estimates for required financing to reach the established targets for e-mobility and will line out more detailed ways of financing electric 2&3 wheelers for use in public transportation.

Furthermore, the strategy will suggest policy reforms beyond the targeted interventions outlined in Component 3 to further incentivize electric mobility. It will therefore provide a holistic framework addressing the ecosystem of electric mobility in Sierra Leone and in particular the introduction and upscaling of electric 2&3 wheelers for use in fleets. The verification of the set targets and milestones and further steps to implement the strategy will be linked to the outcomes of the demonstration. The development of a financial scheme (output 3.2) to facilitate investment into electric 2&3 wheelers will be a crucial step to show the ability of private sector, government and financial institutions to implement the strategy.

The national e-mobility strategy will also discuss the possibility of locally assembling electric 2&3 wheelers, based on experience in other countries in East and West Africa, notably Kenya and Liberia. Local assembly of electric 2&3 wheelers has been identified a viable option to locate some of the e-mobility value chain in Sierra Leone while reducing the tax burden on imported e-vehicles at the same time, and to create green jobs in the country. The evaluation of local assembly will also include the option of locally retrofitting used conventional keke chassis with electric power-train and batter storage, based on experience with retrofitted e-keke in Liberia.

Finally, the strategy will also include action items to address gender-based inequalities in the public transport sector, women's representation and participation in decision-making, and investing in women's capacity in the e-mobility industry. The Project Management Unit will liaise with and seek the support of the Ministry of Gender and Children's Affairs on these particular aspects.

D 1.2.1 Set-up of the national strategy development team, including ToRs for the International Policy, Business and Strategy expert

D 1.2.2 National e-mobility strategy workshop

D 1.2.3 Collection and consolidation of transport and energy sector data

D 1.2.4 Draft gender sensitive national e-mobility strategy

D 1.2.5 Final gender sensitive national e-mobility strategy, submitted for adoption

Output 1.3: Key stakeholders are trained in the EV global programme activities (regional workshops, training and thematic working groups) and awareness is raised among key stakeholders on electric mobility.

Key stakeholders from government, private sector stakeholders, civil society, and academia participate in global events as agreed with the Project Management Unit. The participants will include decision-makers and/or operational staff as targeted by the platform event. The Chief Technical Advisor will be responsible for identifying and selecting the individuals to participate in the different events, in consultation with the PMU and the e-mobility coordination body. The Chief Technical Advisor will seek to ensure at least 30% of the participants selected for participation in the events are female, as outlined in the Gender Action Plan.

D 1.3.1 Participation in the launch of the Africa Platform

D 1.3.2 Participation in the first regional electric mobility training

D 1.3.3 Participation in the first regional training on electric 2&3-wheelers

D 1.3.4 Participation in the first meeting on financing/marketplace

D 1.3.5 Participation in the second meeting of the Africa Platform

D 1.3.6 Participation in the second regional training on electric 2&3-wheelers

D 1.3.7 Participation in the second meeting on financing/marketplace

D 1.3.8 Participation in the third meeting of the Africa Platform

D 1.3.9 Participation in the replication event

Component 2: Short term barrier removal through low-carbon e-mobility demonstrations

Outcome 2: Technical, financial and environmental feasibility of introducing e-mobility in the country is successfully demonstrated by developing a business case for e-kekes.

This component pilots approximately 15 electric kekes as part of a commercial keke fleet owned by a local private sector partner who provides ride-hailing service. The objective of this component is to develop and demonstrate a business case for electric kekes as part of an existing commercial keke fleet, owned and operated by a local partner. The business model of the company is to run a small fleet of their own until their business grows with more individual drivers joining their ride-hailing service. By using the ride-hailing app, drivers can reach more customers and save fuel costs, while providing more reliable services to passengers. At the same time, the drivers are monitored through the mobile application, which improves accountability of the drivers on many levels: 1) Provision of better service to the client since the client can rate the drivers' performance; 2) Transparency with regards to daily trips, which helps fleet operators to better monitor their fleet performance and revenues; 3) Management of daily profits generated by the drivers and provision of data for payback of loans. Ride hailing applications offer benefits for all taxi services. The current proposal focuses on e-kekes because: 1) government expressed preference over motorcycle taxis due to security and road safety issues; and 2) new passenger cars and in particular new electric cars are currently beyond the purchase power of individual taxi drivers and fleet owners in Sierra Leone. In addition to the mobility provider, a potential private sector partner with experience working on e-kekes in Liberia (Emergi) has been identified and is in discussion for a role within the project, for example for importation of e-kekes.

While e-keke with a battery capacity of about 5 to 6 kWh can be charged at any socked over a duration of 5 to 6 hours (e.g. overnight), and using grid electricity, the project also aims at the demonstration of charging of e-kekes at least partly using renewable solar power generated off-grid. Therefore, a grant of up to USD 60,000 provided by UNEP and stemming from the European Commission funded SOLUTIONSplus project will allow the procurement of charging equipment and some targeted support for local innovators to build and / or operate at least one charging station serving at least 5 e-kekes, which shall use at least 50% renewable power. This includes the development of a business model for operation of the charger, based on the lessons learnt from relevant demonstration projects under the SOLUTIONSplus project. Therefore, 5 of the e-kekes will be purchased including a second battery, to evaluate the possibility of a battery swapping scheme. The remaining e-kekes will be charged overnight using grid electricity at places yet to be identified, and possibly including third parties, such as fuel station operators. It will be the purpose of the feasibility study to detail the exact arrangements for vehicle charging.

While the focus lies on the importation of assembled or semi-knocked down electric keke for the purpose of the demonstration project, it is part of the national e-mobility strategy (Output 1.2) development to evaluated the option of locally assembling and / or manufacturing electric keke, including the retrofitting of used conventional keke chassis with electric powertrains and battery energy storage.

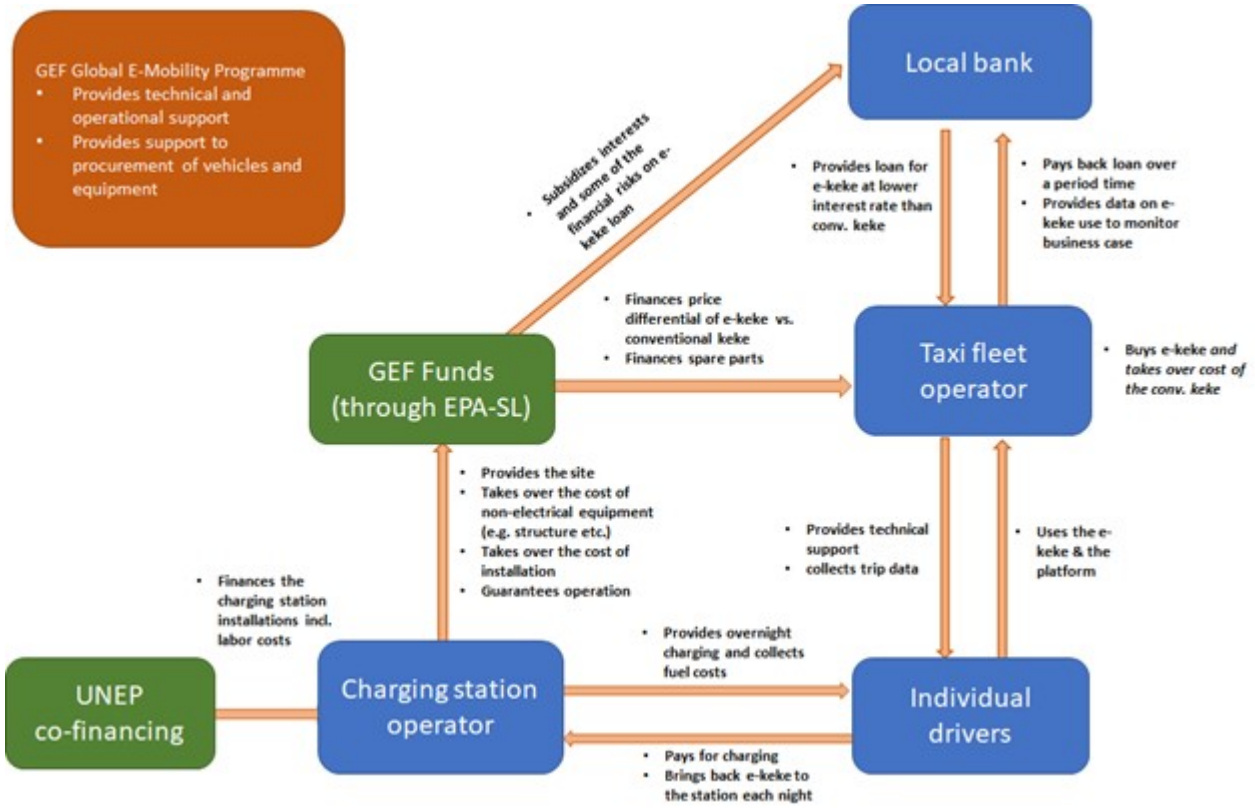

Figure 7 Demonstration implementing structure

Financing: The GEF funding will finance the price differential between e-kekes and conventional kekes, and will be received by the private keke operator. With the help of the GEF funding, the keke operator will be able to purchase e-kekes at the price of conventional kekes, leaving him with the technical risk of the unknown technology. For the remainder of the funds required to purchase e-kekes, a local bank will provide loans to the fleet operator at the same or even lower cost than conventional kekes. Alternatively, a partial risk guarantee that guarantees the funds of the bank and a significant share of the funds of the operator could be considered. This would enable the bank to provide a loan at significantly lower capital costs but requires the private sector stakeholder to take over the costs of the entire e-vehicle (with a share of the funds guaranteed by the instrument), which might not be possible. Both possible financing options can lay the ground for the establishment of financial mechanisms including a local financial institution (such as Rokel bank) and international financiers (such as development banks or green funds such as the GCF), which could be used for up-scaling the e-2&3 wheeler fleet in Sierra Leone.

In addition to the GEF fund, UNEP co-financing of up to USD 60,000 stemming from the SOLUTIONSplus project will be used to set up a hybrid charging system to support the at least 5 e-keke of the fleet, including targeted support for installation, operation, and insurance. The installation and/or operating company will be selected through a competitive process following the requirements of SOLUTIONSplus project.

Procurement: With the loan and the GEF subsidy, the taxi fleet operator will be able to purchase e-kekes. Through the support of the Global Electric Mobility Programme, the GEF project will provide support to the fleet operator in choosing a suitable e-keke model. In addition, e-keke spare parts will be procured along with the e-kekes using the GEF fund due to the limited EV dealership presence in Sierra Leone. For the charging equipment, UNEP is considering working with the United Nations Office for Project Services (UNOPS) to procure the charging equipment.

Alternatively, and based on continued discussion with project stakeholders, it could be considered to follow the example of a pilot project implemented by the Dutch company Emergi in Monrovia, Liberia, whereby used conventional keks will be retrofitted with a new electric powertrain and battery system. While in a first step these retrofitted vehicles used in the Liberia pilot will be imported from India, it is envisaged to later on import only the electric drive-train and battery system and to source the used kekes and to execute the conversion locally. Depending on the experiences of Emergi in Liberia, such a scheme is can be within the scope of the Sierra Leone E-Mobility project.

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Fleet operation: The taxi fleet operator/ride hailing app provider, selected to collaborate under this project, will be required have his own data collection system that can collect and analyse data on the use of e-kekes to inform the project as part of the established monitoring framework. The operator should be also responsible for providing technical support to his individual drivers. It is proposed that individual drivers are directly hired and supervised by the operator.

Charging: A partner to provide e-keke charging with at least partly renewable electricity will be identified and will work closely with the fleet operator. Proposed responsibilities of the partner include (1) to provide site(s) for charging stations; (2) to take over the cost of non-electrical equipment for the charging stations (e.g. structures); and (3) to take over the installation (labour) costs; (4) to guarantee the operation of the charging units, and finally (5) to collect charging fees.

UNEP with support from SOLUTIONSplus project, will finance the charging equipment and will cover the required cost of insurance. It is proposed that individual drivers will be responsible for driving e-kekes to the charging station(s) every night and payment for charging.

Potential partners to collaborate on e-keke charging include for example local petroleum fuel stations and the depots of the local private sector taxi fleet operator.

Outputs:

Output 2.1: A comprehensive implementation plan for electric vehicles demonstration including a low-carbon charging scheme, and a data collection framework are developed along with the reporting and analytical framework.

The implementation plan is developed for operating approximately 15 electric kekes in a partnership with a private sector partner.

D 2.1.1 Detailed terms of reference including an implementation plan and deliverables for the International E-Mobility Technology expert and the National E-Mobility Technology Expert

D 2.1.2 A private sector partner to implement the demonstration is officially selected and onboard

D 2.1.3 A study to identify locations, technology and capacity of a e-keke charging (including both overnight charging and battery swapping) is developed

D 2.1.4 A draft feasibility study including the development of business models for the vehicles and the charger operators as well as a finance scheme is developed and presented during workshop to the coordination body for endorsement

D 2.1.5 The final feasibility study and the demonstration implementation plan including framework for data collection, reporting, and analysis are developed

Output 2.2: Demonstration vehicles and charging equipment are procured, staff trained, demonstration projects are implemented, monitored and data are collected, analysed, and disseminated.

D 2.2.1 Technical requirements of the electric vehicles and charging equipment to be procured are developed

D 2.2.2 Procurement of 15 electric kekes, based on specifications established in D2.2.1, to be managed by EPA-SL

D 2.2.3 Procurement and installation of charging equipment, based on specifications established in D2.2.1, to be managed by UNEP

D 2.2.4 Driving manual and protocol established, with operation and safety training conducted with drivers[19]

D 2.2.5 Final report on the demonstration results presented to the coordination body and the Global Electric Mobility Programme

The company will provide local expertise and will be assisted in procuring electric vehicles through the Global Electric Mobility Programme.

Component 3: Preparing for scale-up and replication of low-carbon electric mobility

Outcome 3: The government adopts fiscal policies & regulations and endorses a financing scheme to accelerate the introduction of electric vehicles in Sierra Leone.

First of all, this component focuses on developing the regulatory, fiscal and local policy framework to incentivize the large-scale introduction of electric mobility in Sierra Leone based on the technical documents developed and the experience gained with e-keke procurement, operation, and maintenance, including the identification of viable schemes and business models for e-keke charging (possibly including battery swapping) under component 2. While the focus is on the introduction of electric fleet vehicles such as e-kekes, the framework is not limited to these modes but will also develop measures applicable to the import and registration of energy-efficient and clean passenger cars. It is desirable to develop technology-neutral policy measures, but specific incentives to the electrification of the transport sector will be duly considered.

In addition to improving the policy framework (output 3.1), component 3 looks at the development of a financial scheme (output 3.2) to incentivise the purchase of electric 2&3 wheeler for operation in taxi fleets. The financial scheme will be developed in cooperation with a local financial institute (such as for example Rokel Commercial Bank or ACTB Savings and Loans) and targets the development of a financial product, which allows for financing the higher upfront investment costs of electric 2&3 wheelers, taking into account lower operational costs and therefore anticipating higher daily income of the vehicle operators. With the support of the Global E-Mobility Project and its Africa regional Support and Investment Platform, it will be evaluated whether there are financial institutions interested in providing credit lines for investment into electric mobility to commercial banks in Sierra Leone, allowing for preferential conditions for lender willing to buy electric keke instead of conventional keke.

Through improving the policy and regulatory framework and by developing a finance scheme for electric 2&3 wheelers in Sierra Leone, Component 3 is closely linked to the targets, milestones and actions identified in the national e-mobility strategy developed under Component 1 (output 1.2).

Outputs:

Output 3.1: Fiscal policies and regulatory schemes to incentivize the uptake of electric mobility are developed and formally proposed.

Based on the gaps identified in the national e-mobility strategy developed under component 1, and with the support of the Global Programme materials, policy proposals are developed and submitted for adoption. These proposals include 1) a reform of vehicle import taxation to incentivize the purchase and import of energy-efficient and clean vehicles and relevant equipment; 2) a reform of vehicle import regulation to incentivize the purchase and import of energy efficient and clean vehicles and relevant equipment, e.g. based on combined age and emission standard limits for the import of used vehicles and containing clear regulations for the import of electric vehicles; 3) a reform of vehicle registration to incentivize the use of energy-efficient and clean vehicles.

D 3.1.1 Detailed terms of reference are developed including an implementation plan and deliverables for the International Policy, Business and Strategy expert

D 3.1.2 Draft vehicle import taxation proposal developed and presented at a workshop

D 3.1.3 Draft vehicle import regulation proposal developed and presented at a workshop

D 3.1.4 Draft vehicle registration proposal developed and presented at a workshop

D 3.1.5 Final policy package delivered and presented

Output 3.2: Based on the demonstration project, a financing scheme including a procurement guideline and business models for the procurement of electric vehicles is developed and formally proposed

This Output builds upon the results of the demonstrations from Component 2. The objective of this output is to make the purchase and use of electric 2&3 wheelers more attractive and viable than its conventional equivalent.

D 3.2.1 Detailed terms of reference including an implementation plan and deliverables for the International Policy, Business and Strategy expert and the National E-Mobility Technology Expert

D 3.2.2 Draft financing mechanism and business models developed and presented

D 3.2.3 Final financing scheme, a procurement guideline, business models developed and proposed

Component 4: Long-term environmental sustainability of low-carbon electric mobility

Outcome 4: Measures are developed to ensure long-term environmental sustainability of electric mobility in Sierra Leone

This component targets the development of initial strategies to ensure the environmental sustainability of the introduction of electric mobility in Sierra Leone. It focuses on two main areas: 1) The integration of renewable power for the charging of electric vehicles; and 2.) The collection, re-use, and preparation of used electric vehicle batteries for recycling and safe disposal. Acknowledging the constrained budget and the scope of the task, this component seeks for the development of a first step to sensitize project stakeholders for the problem and to start working in parallel with the introduction of electric vehicles on the issues of waste management and sustainable power supply.

With regards to renewable power integration, this component aims at aligning the targets of the e-mobility strategy with plans to invest in renewable power generation in Sierra Leone. It will investigate the opportunities of using solar power for 2&3 wheeler battery charging. This study (output 4.1) is therefore closely linked to the feasibility study and implementation plan for the e-motorcycle demonstration developed under output 2.1, also integrating the option of charging e-kekes using solar power produced off-grid. Given the low rate of access to grid electricity of the population in rural areas of Sierra Leone, the off-grid charging of electric 2&3 wheelers might very suitable for use of electric 2&3 wheelers outside the city of Freetown and other urban areas with better access to grid power. The study on renewable power integration will explicitly include the potential of charging electric 2&3 with off-grid solutions and integrating either battery storage systems (within the charging systems) or battery swapping schemes (for electric 2&3 wheelers). E-mobility based on light vehicles with small batteries are regarded a viable option for integration in off-grid power systems such as local micro and mini-grids.

Regarding Output 4.2, the UNEP Sustainable Mobility Unit (SMU) will work closely with the Economic Community of West African States (ECOWAS) to support the development of this scheme, with a view to present Deliverable 4.2.3 (scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries) to the ECOWAS community through formal discussions to pursue the development of such a policy at the sub-regional level.

Output 4.1: A study on integration of renewable power for electric vehicle charging is carried out and formally disseminated.

E-mobility should benefit from the addition of new renewable power generation that are planned by the Government of Sierra Leone. The objective of this Output is to propose a scheme that supports the alignment of supply and demand and that is tailored to the needs of renewable power producers and EV fleet operators. This activity will be closely coordinated with the economic feasibility analyses.

D 4.1.1 Detailed terms of reference are developed including an implementation plan and deliverables for the International Charging & Renewable Energy integration expert

D 4.1.2 A draft study to integrate renewable power for electric vehicle recharging and technical standards for 2&3 wheelers are developed and circulated for review

D 4.1.3 The study to integrate renewable power for electric vehicle recharging is finalized and disseminated to all local stakeholders and the Global Programme knowledge management focal point.

Output 4.2: A scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries is developed and formally proposed.

After reaching the end of their lifespan, EV batteries still can be reused in other less-demanding situations, for instance as stationary energy storage devices for charging phones in rural Sierra Leone with minimal access to electricity. As second-life usage significantly reduces the ecological footprint of batteries as opposed to recycling or disposal, options for their re-use will be explored in a study.

D 4.2.1 Detailed terms of reference are developed including an implementation plan and deliverables for the International Battery Technology expert

D 4.2.2 A draft scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries is developed and presented for review

D 4.2.3 The scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries is finalized and disseminated to all local stakeholders, the coordinating body and the Global Programme knowledge management focal point.

Theory of Change

Below (Figure 8) is the overall project's Theory of Change (ToC). The ToC provides a visual representation of the project complete intervention logic. Through institutionalization of e-mobility (e-mobility coordination body and strategy, outputs 1.1 and 1.2) and capacity building (output 1.3), in combination with on-the-ground experience with e-mobility through demonstration of electric kekes within a taxi fleet in Freetown (outputs 2.1 and 2.2), the basis will be laid for informed policy making (output 3.1) and the development of a finance scheme (output 3.2) to prepare for the upscaling of e-mobility in Sierra Leone. Preparing the long-term sustainability of e-mobility through the development of ways to integrate higher shares of renewable power for e-vehicle recharging and to line out possibilities to combine the use of electric 2&3 wheeler with off-grid charging solutions (ouput 4.1) and the development of an initial scheme for the collection of used EV batteries for re-use, recycling and safe disposal (output 4.2) ensure a holistic approach to introduce e-mobility in Sierra Leone.

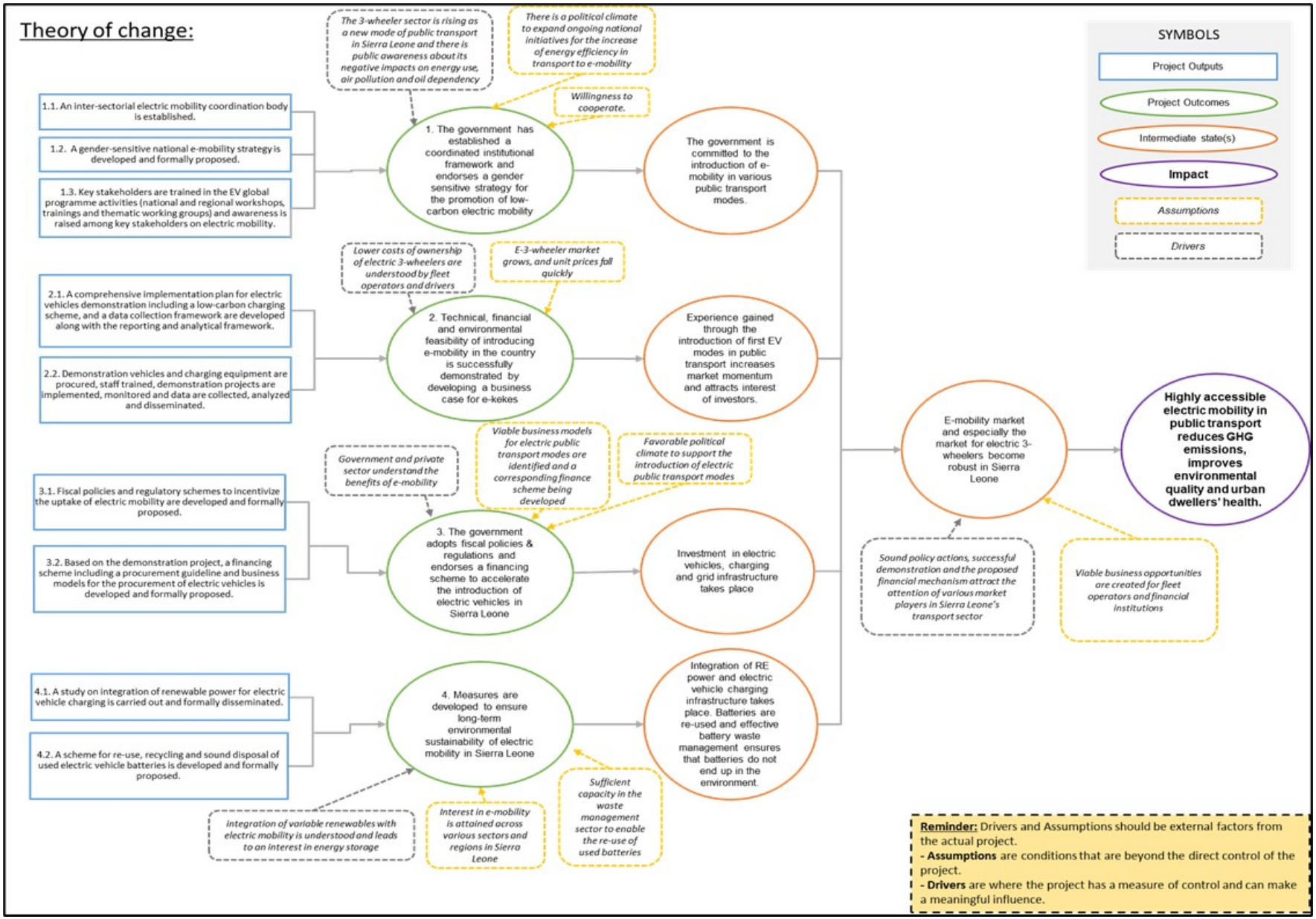


Figure 8 Theory of change of the GEF project

4) Alignment with GEF Focal Area and/or Impact Program strategies

This programme is aligned with Objective 1 of the Climate Change Focal Area to “Promote innovation and technology transfer for sustainable energy breakthroughs”, through CCM 1-2 - Promote innovation and technology transfer for sustainable energy breakthroughs for electric drive technologies and electric mobility.

5) Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing

The GEF is covering incremental costs of barrier removal in Sierra Leone, in particular the costs of:

· Building capacity, raising awareness, identifying policy gaps;

- Developing strategies and studies to introduce and upscale e-kekes in Sierra Leone;
- Developing technical specifications to buy appropriate, reliable and high-quality e-kekes;
- Developing a financing mechanism to overcome the higher upfront cost of e-kekes;
- Developing the policy framework for the large-scale introduction of e-mobility, and in particular e-kekes;
- Developing a strategy to integrate the use of renewable power for e-vehicle charging and;
- Developing an initial scheme for the re-use and collection of used EV batteries.

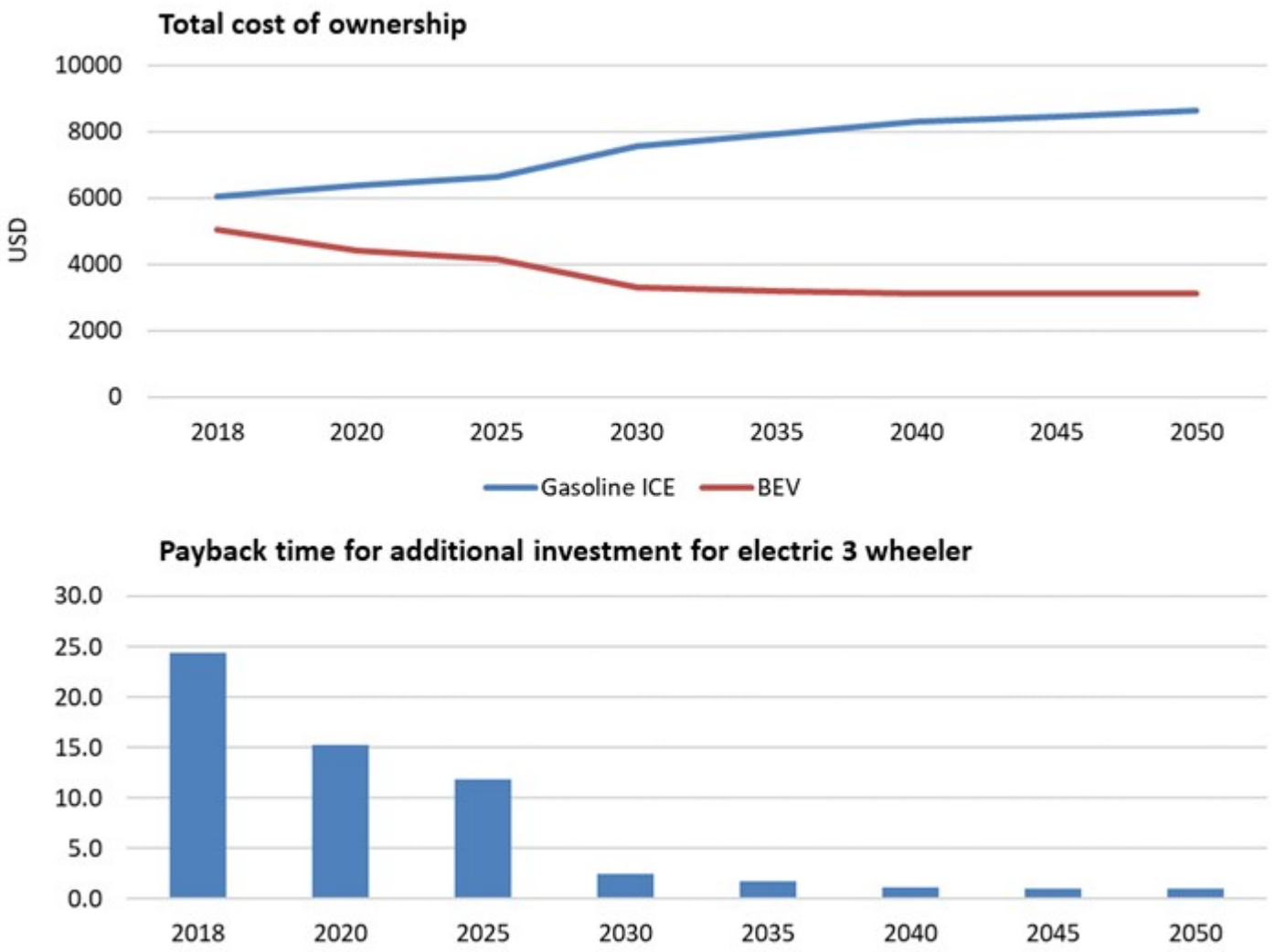


Figure 9 Estimate of total cost of ownership and payback time for additional investment of electric kekes vs. conventional kekes

Already today, the total cost of ownership for an electric keke used as a taxi is supposed to be lower compared to the conventional kekes and payback time for additional investment without any tax benefits or financial instruments is below 1.5 years. Yet, the investment costs are higher and there are other non-financial barriers, including first and foremost a lack of access to the technology in Sierra Leone, as no supply chain exists. Furthermore, a lack of permitting and registration rules and technical safety standards exist, which are additional barriers.

The structure of the intervention will ensure that the GEF funds cover the incremental costs of barrier removal. The contributions from the local stakeholders exceed their baseline activities. Ministries, the administration, civil society and other organisations will contribute to discussions, planning meetings, participatory processes as well as managing the transition to e-kekes in the form of own contributions/in-kind financing. The ride-hailing company will contribute investment costs as in the baseline case plus undergo significant additional costs, for example in terms of the risks, added transaction costs, added inconvenience, and necessary training and safety measures for their drivers, in order to facilitate the testing and demonstration of the viability of e-kekes under real-life conditions in the daily Freetown traffic.

The GEF intervention is geared towards reducing payback time of electric kekes, by introducing preferential tax rates and a financial mechanism to provide loans to consumers for the purchase of electric kekes at lower interest rates compared to the commercial rates of 25% and more, as well as longer payback times (e.g. 18 months instead of 12).

The intervention of the project will lead to a de-risking of investments, both for the financier to introduce and scale-up the e-keke market and for the consumer.

The co-financing contribution of Ministry of Energy in form of public investment into renewable power generation capacity will contribute to lowering the carbon footprint of grid power in Sierra Leone, which will be used to power the larger part of the future e-vehicle fleet in Sierra Leone. According to the National Renewable Energy Action Plan (NREAP) of the Republic of Sierra Leone, the share of renewable power generation capacity is targeted to grow to 65.3% by 2030 (compared to 57.8% in 2010 and 52.3% in 2020)[20]. The public investment implemented by Ministry of Energy will contribute to reaching that target and to close the incremental cost gap of sustainable electric mobility in Sierra Leone.

In addition, the project is supported by the global project, so that the incremental costs are minimized and global synergies are leveraged through economies of scale. The global knowledge management component and the regional platform approach seek to bundle demand in the region and thus reduce the incremental costs. The Global Programme also reduces incremental costs through the following means:

- Generic tools are produced at the global level, disseminated through regional support and investment platforms and adapted to the needs in the country at the country level – thus return on investment for the development of tools and methodologies is maximized;
- Investment risk for demand side – bundling demand for e-vehicles for demonstration in a certain region can lead to lower vehicle prices and easier enforcement of technical standards;
- Technology risk for supply side – through adequate training of vehicle operators and exchange between numerous projects, the industry is less likely to face misuse of technology.

Without the intervention of the GEF, local keke-users will not be able to get access to the electric version of their vehicle, and face higher purchase prices, which will ultimately stall the introduction of electric kekes in the country. This in turn will lead to the influx of more polluting conventional kekes into the market, which is growing at high annual rates.

6) Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

The projected CO_2 emissions reductions are based on the benefits which will stem from the introduction of electric 2&3-wheelers in Sierra Leone. Although, most of the outputs of the project are geared towards the introduction and scale-up of the e-keke market, the electric motorcycle market will equally benefit from the introduced policies, business models and financial schemes. In addition, no data is available splitting the 2&3 wheeler market in motorcycles and 3 wheelers.

It is estimated that in 2019, 2&3-wheelers, including kekes, were responsible for about 150,000 to 200,000 tons of CO2 emissions. In the baseline scenario, it is projected that the 2&3 wheeler fleet in Sierra Leone will almost double in size from about 40,000 to 50,000 vehicles today to about 80,000 in the next ten years, and to almost triple to about 140,000 in 2050. Therefore, in the baseline CO_2 emissions from conventional 2&3wheelers would almost double by 2032, and more than triple by 2050. This growth of CO_2 emissions would go hand in hand with a growth in air pollutants, especially since pollutant emissions of new and used 2&3 wheelers in Sierra Leone are not regulated.

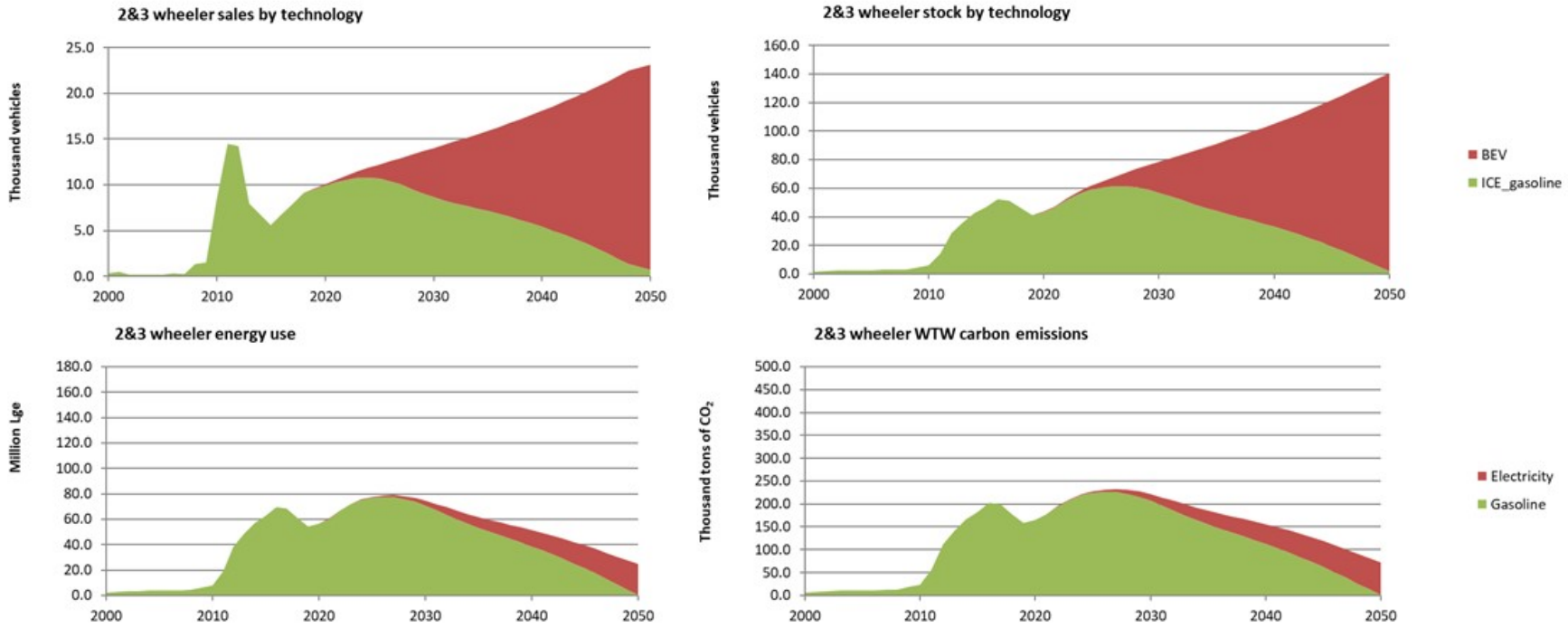


Figure 10 ALTERNATIVE SCENARIO FOR KEKE SALES, FLEET, ENERGY USE AND GHG EMISSIONS

Under the alternative scenario, total sales and stock of 2&3 wheelers in Sierra Leone are assumed to be identical with the baseline scenario. For calculating the GHG emissions savings, it is assumed that the institutionalization of electric mobility, the short term barrier removal as well as the preparation for scale-up of the e-mobility market and in particular the development of a fiscal and regulatory framework, as well as the introduction of a financial mechanism, will trigger a substantial shift towards the use of electric 2&3 wheelers. It will lead to projected sales of about 600 electric 2&3 wheelers by 2025, quickly escalating to 30 percent of the market by 2030 and a complete switch to electric 3-wheelers by 2050. A conservative assumption with regards to the decarbonisation of the power mix has been integrated: by 2050, carbon footprint is estimated to reduce to 320gCO2/kWh, from currently about 450 gCO2/kWh. Projections of 2&3 wheeler sales, fleet size, energy use, and GHG emissions under the alternative scenario are shown in Figure 10.

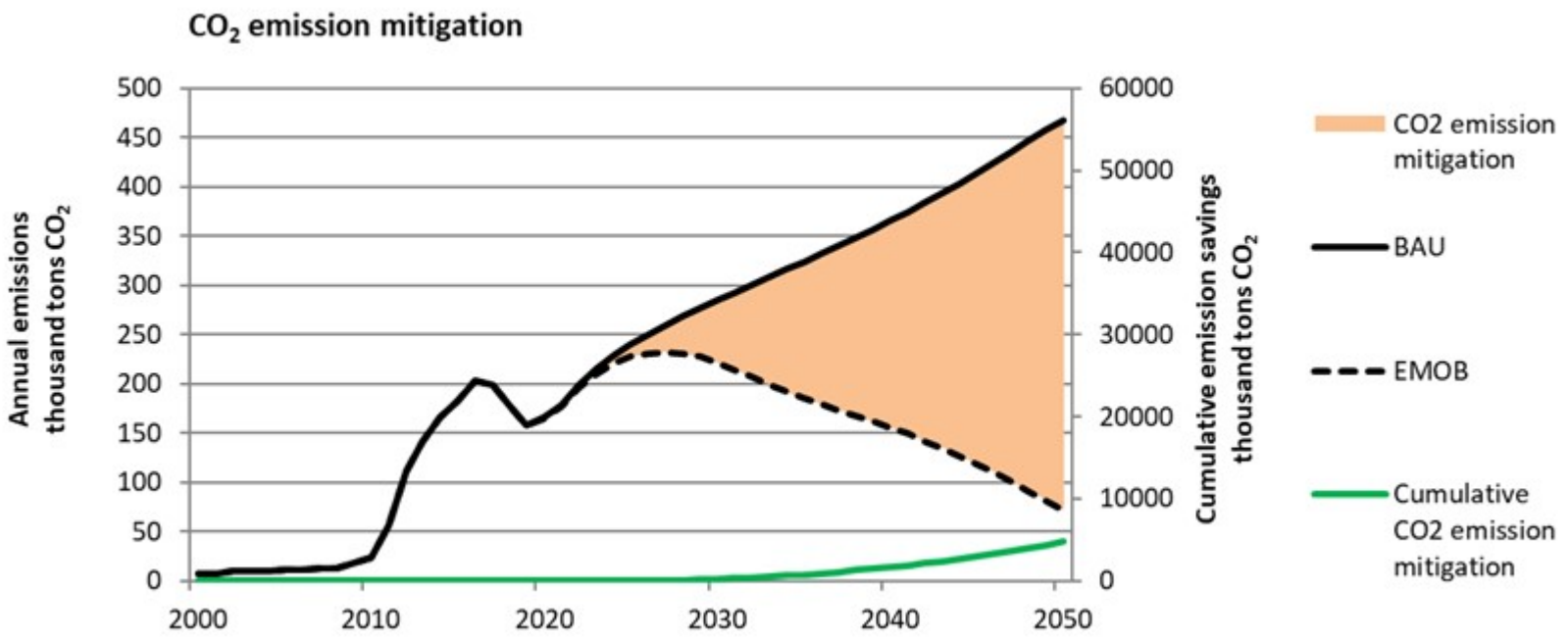


Figure 11 Top down emission mitigation from electrification of 2&3 wheelers

A top-down CO_2 mitigation projection was carried out for the potential CO_2 savings accruing from the market introduction and upscaling of both, electric 2&3-wheelers. Annual CO_2 emission savings for these two vehicle groups would account for 2.9 ktCO2 by 2025, 39.4 ktCO2 by 2030, and 388.9 ktCO_2 by 2050. Cumulative top-down CO_2 emissions savings reach 5.4 ktCO_2 by 2025, 107.3 ktCO_2 by 2030, and 4,241.2 ktCO2 by 2050.

Total top-down emission reduction potential 2021 to 2036, tCO2	**646,183**
Thereof	
Total direct emission mitigation from demonstration, tCO2	209
Total secondary direct emission mitigation, tCO2	116,212
Total indirect impact emission mitigation, tCO2	271,162
Total project related emissions reductions, tCO2	**387,548**

Under the assumptions described above, the total cumulative top-down emission reductions that could potentially be achieved by 2036 account for 646,2 $ktCO_2$. Of this total emission reduction potential identified by the top-down analysis of the entire Sierra Leone 2&3 wheeler sector until the year 2050, only a portion will be achieved through the interventions of the project (refer to further explanations below on the causality factor).

Direct emission reductions achieved cumulatively over the assumed 6 years of the lifetime of electric 3-wheelers account for about 209 tCO_2.

Secondary direct and indirect emission reductions are based on 1) Introduction of regulatory and fiscal policies; 2) Impacts of business models and finance schemes developed; and 3) Experience gained during the time of the project and cover a time frame of 15 years after the purchase of the demonstration assets (i.e. 2021 to 2036, based on the assumed lifetime of the purchased charger). Secondary emission reductions based on additional investment as a result of the project are estimated to account for 116,2 $ktCO_2$ Total indirect emissions savings account for about 271,2 $ktCO_2$. Both secondary direct and indirect emission reductions are based on the application of a Level III causality factor (60%) to the total top down emission reduction potential and a split of 30/70 between secondary direct and indirect emission reduction.

A level III causality factor (60%) has been conservatively chosen since the GEF funded demonstration project only covers 3-wheeler vehicles (while the policy interventions under output 3.1 also cover 2&3 wheelers and cars) and acknowledging that other projects such as the IRUMP are implemented in parallel in Sierra Leone (although not focusing on transport energy efficiency or electric mobility).

As such, the total GHG emission reductions attributable to the project thus account for 387,6 $ktCO_2$ for the time frame 2021 to 2036.

7) Innovativeness, sustainability, and potential for scaling up

Innovativeness:

This project is innovative from various angles: 1) It promotes a new and innovative clean and low carbon transport technologies; 2) It promotes the integration of low carbon power and transport; 3) It promotes the deployment of innovative business models for electric keke operation and charging; 5) It promotes the development of innovative financing schemes for electric mobility by investigating financing models for climate change mitigation within the transport sector; and 6) It promotes environmental sustainability by tackling the issue of collection of used EV batteries for re-use, recycling or safe disposal.

The use of electric 3-wheelers has the potential to create an interface between the transport sector and the power sector in Sierra Leone, which 1.) will lead to increasingly cleaner mobility with increased share of renewable energies in the power mix and 2.) can accelerate the introduction of renewable power generation in Sierra Leone, especially in remote areas with no access to the national grid, where economic viability of mini-grid solutions might be increased through the additional power demand stemming from electric 2&3wheelers integrated in such mini-grid systems. Integration of electric 2&3 wheeler charging with solar kits or mini grids is simple and cheap due to the fact that batteries need direct current (DC) and the solar panels produce DC power, which means for example that there is no need for costly inverters. Furthermore, the controller to manage the quality of the power delivered to charge the batteries is a very simple and cheap device. Hence, it is possible that the introduction of electric 2&3wheelers can trigger new business practices in off grid applications whereby the electric vehicle battery could also be used for other applications such as for power supply for use of television or other electronic devices.

Environmental Sustainability

The proposed project seeks to improve air quality through sustainable and low-emissions transport and aims to mitigate GHG emissions through promoting low-emissions transport.

The project has two outputs dedicated to environmental sustainability: 1) The development of an initial scheme to collect used EV batteries for re-use, recycling, and safe disposal; and 2) The integration of renewable sources of power generation for charging electric vehicles in Sierra Leone.

Both outputs ensure that the issue of potentially hazardous waste is tackled right from the beginning of the introduction of EVs in Sierra Leone and that the long-term sustainability with regards to truly zero- or low-carbon transportation is planned.

Sustainability of market development after the project & potential for scaling-up:

The project will be closely linked to the Africa Support and Investment Platform. Through this platform and the cooperation with various development banks such as the African Development Bank (AFDB), the West African Development Bank (BOAD), the World Bank but also private investors such as the Private Infrastructure Development Group (PIDG), it is anticipated that the project will lead to the unlocking of financing to upscale the market of electric 2&3-wheelers in Sierra Leone. Component 3, output 3.2 focusses at the development of a financing scheme, which shall ideally involve at least one local commercial bank and at least one international financing institution. The target is to develop a scheme which involves a local commercial bank to develop a financial product aiming at providing financing for the purchase of electric 2&3 wheelers at preferential conditions (i.e. longer payback time and lower interest rate), which his based on the intervention of an international financing institution which is to provide either conditional credit or some other form of risk mitigation to the local commercial bank, e.g. through a first loss guarantee or something similar. With the help of the Africa Support and Investment Platform the developed scheme is brought to the attention of interested financiers. It is one of the goals of the project to create an understanding that electric 2&3wheelers are often one of the most affordable mobility options for passengers while increasing profitability for drivers. Together with the development of an adequate financial scheme as described above the market is envisaged to move towards the larger-scale adoption of electric 2&3wheelers.

The Africa Platform will be operational beyond the lifetime of the Sierra Leone e-mobility project and is anticipated to become the leading marketplace in Africa where potential project concepts meet potential financiers and potential technology suppliers. It is hence anticipated that the GEF Sierra Leone E-Mobility Project will lay the ground for a transformational shift towards electric mobility in Sierra Leone. This is based on the removal of market barriers outlined above, namely capacity building, the introduction of the technology to Sierra Leone's market, the introduction of an adequate policy framework, and the provision of business models and financial schemes. In addition, the Global Project and in particular the Africa Support and Investment Platform will play a crucial role in knowledge management, which allows for example the transfer of lessons learnt and best practice not only from developed countries to developing countries but also to spill-over capacity from the various initiatives and project in the region. For example, the Sierra Leone E-Mobility Project is envisaged to benefit from the findings coming from similar projects in Togo, Burundi and Madagascar and will benefit from e-mobility demonstration projects already implemented and operational in Kenya, Rwanda and Uganda.

[1] CO_2 Emissions from Fuel Combustion Highlights (2019 edition), IEA 2019

[2] IEA Mobility Model 2017

[3] Third National Communications Report of Sierra Leone to the United Framework Convention of Climate Change (UNFCCC), UNFCCC, 2017

[4] Third National Communications Report of Sierra Leone to the United Framework Convention of Climate Change (UNFCCC), UNFCCC, 2017

[5] Transport Sector Statistics Bulletin 2013, Statistics Sierra Leone 2014

[6] Integrated Resilience Urban Mobility Project (IRUMP, P164353), World Bank 2019

[7] Third National Communications Report of Sierra Leone to the United Framework Convention of Climate Change (UNFCCC), UNFCCC, 2017

[8] Africa Energy Statistics 2015 Edition

[10] Sierra Leone Integrated Transport Policy, Strategy and Investment Plan, 2013

[11] Sierra Leone Integrated Transport Policy, Strategy and Investment Plan, 2013

[12] Africa Energy Portal, AET https://africa-energy-portal.org/country/sierra-leone , accessed September 2020

[13] https://www.investinginsierraleone.com/energy/, accessed May 2020

[14] National Renewable Energy Action Plan (NREAP) of the Republic of Sierra Leone, ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), 2015

[15] Informal transit reform Case of Freetown – Fatima Arroyo-Arroyo, World Bank, 2019

[16] REEEP, 2012

[17] https://www.unops.org/news-and-stories/stories/access-to-energy-giving-sierra-leone-the-power-to-change, accessed May 2020

[18] See co-finance letter from Ministry of Energy attached under Annex O

[19] The trainings of the drivers will be conducted in-situ. As such, no budget has been provisioned for venue and catering in relation to this activity.

[20] National Renewable Energy Action Plan (NREAP) of the Republic of Sierra Leone, ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), 2015.

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

Demonstration sites	*Latitude*	*Longitude*
Freetown, Sierra Leone	8.484444	-13.234444

1c. Child Project?

If this is a child project under a program, describe how the components contribute to the overall program impact.

The Sierra Leone child project is part of the Global Programme to Support Countries with the Shift to Electric Mobility.

The Global Programme is divided into 4 components:

- Component 1: Global thematic working groups and knowledge materials
- Component 2: Support and Investment Platforms
- Component 3: Country project implementation
- Component 4: Tracking progress, monitoring and dissemination

The Global Programme has put in place the monitoring framework below to track progress both globally and at the level of the country child projects. 12 indicators have been designed for this purpose: 6 relying on global level information (highlighted in blue) and 6 relying on country-level information (highlighted in green).

Global E-mobility Programme Monitoring Framework

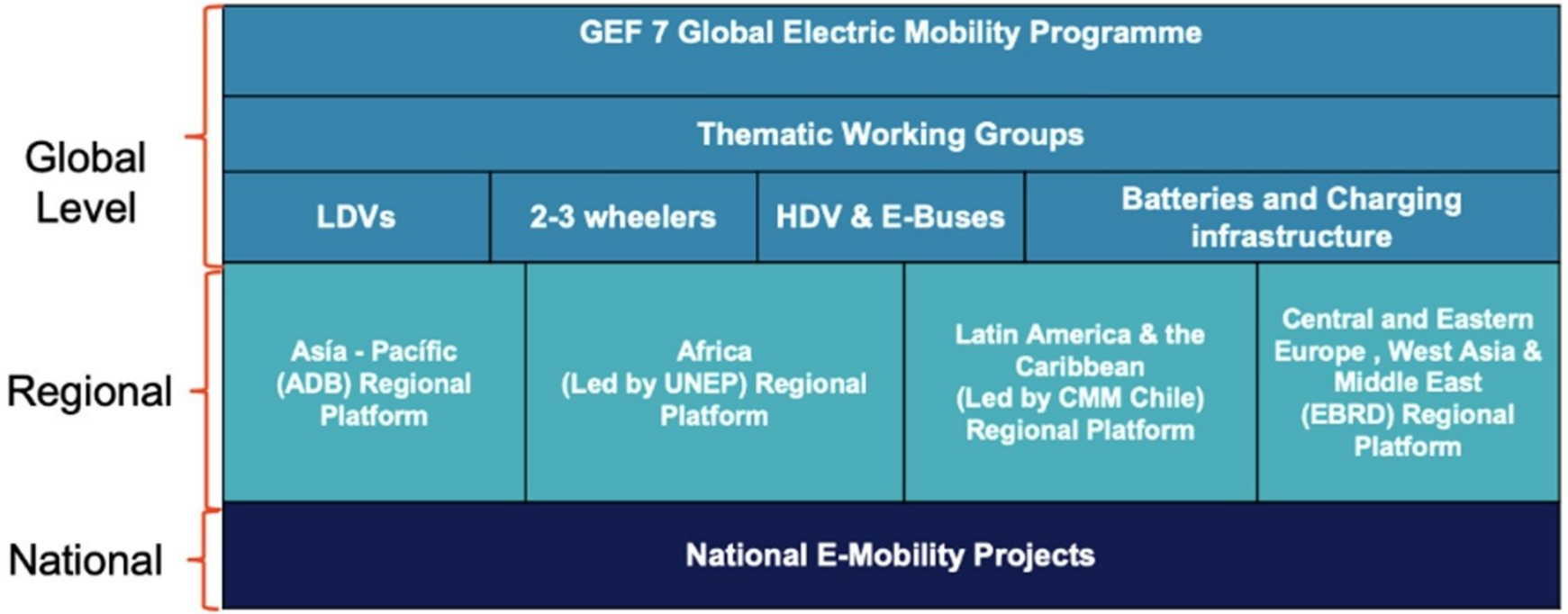
Global level monitoring | Country level monitoring

Objective level indicators			
Indicator A: Direct and Indirect Greenhouse Gas Emissions Mitigated (metric tons of CO_2) mitigated			
Indicator B: Direct and Indirect enegy savings (MJ)			
Indicator C: Number of direct beneficiaries (disaggregated by Gender)			
Component 1 **Global thematic working groups and knowledge materials**	**Component 2** **Support and Investment Platforms**	**Component 3** **Country project implementation (Child Projects)**	**Component 4** **Tracking progress, monitoring and dissemination**
Outcome 1 Knowledge products are generated to support policy making and investment decision-making through four global thematic working groups	**Outcome 2** Conditions are created for market expansion and investment in electric mobility through support and investment platforms	**Outcome 3** Conditions are created at country and city level for the introduction of electric mobility demonstration projects, and wider up take of electric mobility	**Outcome 4** Projects and electric mobility markets are tracked, and key developments, best practices and other lessons learned are shared to promote wider uptake of electric mobility.
Indicator 1.1 # of knowledge products developed by the four thematic working groups and used by the Support and Investment platforms in their training and outreach activities	Indicator 2.1 % of countries using services and knowledge products offered by the Support and Investment Platform	Indicator 3.1 % of countries with an improved institutional framework and a strategy to promote the uptake of low-carbon electric mobility	Indicator 4.1 % of countries generating and sharing best practices and other lessons learned on low-carbon electric mobility with the global programme
	Indicator 2.2 # of e-mobility scale-up and / or replication concepts facilitated as a result of the match-making	Indicator 3.2 % of countries with nationally generated evidence of the technical, financial and/or environmental benefits of low-carbon electric mobility	Indicator 4.2 # of e-mobility knowledge products refined based on evidence coming from the country projects
	Indicator 2.3 # of financial institutions / development banks (national/regional) that have been engaged through the Global Programme and are actively supporting e-mobility projects	Indicator 3.3 % of countries that have improved preparedness to accelerate market transformation towards low-carbon electric mobility	Indicator 4.3 # of non-e-mobility programme countries committing to actively promote the uptake of low-carbon e-mobility
	Indicator 2.4 # of US$ leveraged to scale-up low-carbon electric mobility through the support and investment platforms	Indicator 3.4 % of countries with measures in place to ensure the long-term environmental sustainability of low-carbon electric mobility	

The global project will report against this framework on an annual basis, using (1) the global level data from the Global Thematic Working Groups and from the Support and Investment Platforms, and (2) country-level data provided by each country project during their annual Project Implementation Review (PIR) process.

For this purpose and whenever applicable, the global level indicators highlighted in green are translated into a country-level indicator in the Project Results Framework located in Annex A of the present CEO Endorsement Document. During project implementation, EPA-SL will be requested to report against the indicators of the country Project Results Framework (Annex A) on an annual basis, during the PIR process, in addition to the usual GEF Core Indicators (mentioned at the top of the table above).

At the global level, a steering committee integrated by the International Energy Agency (IEA) and the United Nations Environment Programme will coordinate and monitor the implementation and the outputs of the GEF 7 Electric Mobility Programme. On technical gaps, four thematic working groups at the global level will support the rapid introduction of electric mobility in GEF recipient countries. These working groups will generate universal knowledge products that contain best practices, factsheets, interactive tools and guidance, as well as experiences from countries that have advanced their e-mobility market. The working groups will be integrated by representatives from the global programme regional platforms, GEF-7 countries, IEA, vehicle manufacturers, utilities, researchers and the civil society. The governance structure is presented in the figure below. For Africa, the regional platform will be led by UNEP.



Governance structure between the global programme, the national e-mobility projects, and the regional Support and Investment Platform:

The coordination between the global program, the steering committee, the thematic working groups, and the national projects will be facilitated by the regional Support and Investment Platform. The role of the regional platform is to provide customized technical assistance to ensure the success of the country projects. Moreover, knowledge products developed by the working groups will be adapted and disseminated by the regional platform according to the regional and national context, specific needs and languages.

The Africa Support and Investment Platform will interact with and support participating countries in the region to link with each other through the following activities:

1) The creation of a community of practice for the GEF 7 regional countries;
2) Facilitation of knowledge transfer between countries, and regions, especially those with common characteristics like SIDS;
3) The creation of thematic groups in light-duty vehicles (LDVs), 2-3 wheelers, and buses at regional level;
4) A marketplace between countries, technology providers and financial institutions;
5) Help desk for technical assistance to GEF 7 African countries;
6) Personalized assistance from international experts in electric mobility;
7) Generation of training sessions and workshops.

The national child projects will generate a learning curve on electric mobility that can be transferred to other countries within and outside of the region through the global programme. As a first contact point, the regional Support and Investment Platform will facilitate the flow of learnt lessons from child projects, such as: data and demonstration results, working business models, operational know-how, working financial instruments, and working policies and regulations. At the global level, the scenarios proposed to share country knowledge and experiences on electric mobility are the thematic working groups, while at the regional level the countries will participate in the community of practice, the thematic regional groups, the marketplace, trainings and workshops.

2. Stakeholders

Please provide the Stakeholder Engagement Plan or equivalent assessment.

The key stakeholders to be involved in the project are summarized in the following table. Stakeholders can be categorized into the following groups: 1) government, 2) private sector 3) academia 4) civil society organization and 5) financial sector. Key government stakeholders include the Ministries which will be part of the Project Steering Committee as well as a larger group of Ministries which will be part of the e-mobility coordination body. The ministries that are part of the coordination body will have the political power to drive the necessary regulatory and fiscal reforms to incentivize the introduction of e-mobility and in particular electric kekes in Sierra Leone.

Table 2 List of stakeholders and their roles

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Content engagement, contributions to the project (identified by Component)
Government	Environmental Protection Agency - Sierra Leone (EPA-SL)	· As the GEF focal point in the Government of Sierra Leone, EPA-SL is involved closely in the project design and provide inputs on policy and regulatory aspects pertaining to the GHG and air pollution emissions sector. · EPA-SL also oversees and implements environmental levies, which will have a bearing on project activities regarding the procurement of demonstration vehicles and charging equipment.	· EPA is the Executing Agency during project implementation. · To be part of the inter-sectoral electric mobility coordination body · Provides a co-finance of USD 50,000 (in-kind)
Government	Ministry of Transport and Aviation (MoTA)	· Has overall responsibility for planning and policy in the transport sector · Oversees the Sierra Leone Roads Authority (SLRA), Sierra Leone Road Safety Authority (SLRSA), and the Sierra Leone Road Transport Corporation (SLRTC). · Manages the ongoing World Ba	· Provides co-finance of USD 100,000 · To provide technical inputs, data, and information on the current policy framework and provides input to the demonstration project design. · To provide support to the integrated inventory data collection.

		nk project “Integrated and Resilient Urban Mobility Project (USD 52 mil)”	· To support Component 1,2,4
Government	Sierra Leone Road Safety Authority (SLRSA)	· Responsible for testing and licensing all vehicles and drivers, and for traffic management · Manages vehicle registration and licensing database	· To provide technical inputs, data, and information on the current policy framework, especially with regards to vehicle registration and testing and, will support the demonstration project where applicable
Government	Ministry of Industry and Trade	· Develop policies and programmes to stimulate local and export trade as well as to enhance private sector investment, industrial and economic growth. · Oversees the oil marketing companies that collect fuel levies	· To provide technical inputs, data and information on the current policy framework and will support the demonstration project where applicable. · To support policy review and development during project implementation. · Support on Component 3.
Government	Ministry of Energy	· Implements renewable power projects including 6 MW Solar Park and IFC-funded 50W solar photovoltaic project · Formulate and implement policies, and programmes on energy · Provide oversight functions across the entire energy supply chain for all sector agencies including Electricity Generation & Transmission Authority (EGTC), Electricity Distribution & Supply Agency (EDSA), Electricity & Water Regulatory Commission (EWRC).	· Provides co-finance of USD 1,350,000 (Mobilized Investment through renewable power projects implemented by the Ministry of Energy) · To participate in the Project Steering Committee meetings / Electric Mobility Coordination Body meetings, workshops, trainings and capacity building events. · To provide technical inputs, data, and information on the current policy framework especially with regards to regulation of the power sector and will support the demonstration project where applicable. · To support policy review and development during project implementation

			ntation. · To support Components 1,2,3, 4
Utilities	Electricity Distributio n and Supply Authorit y (EDSA)	· Be responsible for the supply, d istribution and retail sale of electricit y for the entire country	· To provide technical advice an d inputs on the detailed design of th e project as the project relates to th e charging scheme and integration with renewables. · To coordinate with the implem entation of the charging scheme un der Component 2 to ensure long-ter m strategy to integrate e-mobility in to existing power distribution syste m in Sierra Leone is in place.
Government	Ministry of Finance	· In charge of managing the reve nue and finances of the Sierra Leone government	· To advise on policy review and development under Component 1 a nd 3.
Government	Sierra Leone Standar ds Bureau	· Implements and advise on the t echnical standards related to auto fu els and auto parts.	· To provide technical inputs, da ta and information on the current p olicy framework especially with to i mport and safety regulation · To support the demonstration project where applicable · To advise on the technical sta ndards on electric vehicle batteries under Component 4
Government	Ministry of Lands, Co untry Planning and th e Environment	· Responsible for establishing po licies with regards to urban planning and the environment	· To provide policy advice and in puts on the detailed design of the p roject. · To support Component 1,3,4.
Government	Ministry of Gender an d Children's Affairs	· General work on gender mainst reaming and women's empowermen t	· The project will liaise with Mini stry and actively seek their particip ation and contributions during proje ct implementation, in particular in r

			elation to the project's Gender Actio n Plan.
Municipality	Freetown City Council	· Responsible for the designatio n of on-street parking control and en forcement of parking.	· To provide project technical in puts and information on the demon stration planning, design, as well as advice on charging schemes for ele ctric vehicles.
Academia	Fourah Bay College	· The only engineering university in Sierra Leone. · A key academic institution to b e engaged in the capacity building a ctivities under the World Bank IRUM P project.	· To coordinate with the Ministr y of Transport to identify capacity b uilding needs on electric mobility · To contribute to and potentiall y participate in trainings under Com ponent 1
Private sector	Private taxi operator (potentially Taptap)	· Owns an internal combustion e ngine keke fleet run by individual con tractors. · They are interested in the cost-saving aspect of electric kekes. · They run ride-hailing services b ased on a mobile application, which connects mobility users and individu al drivers of kekes.	· To play a crucial role in the im plementation of Component 2 by o perating the fleet of electric 3-wheel ers and an accompanying charging system. · To collect trip data from this d emonstration which will inform the activities under Component 2.
Private sector	Waste management service provider(s) (t o be identified)	· To be identified and engaged d uring the project implementation	· To provide advice and technic al inputs to Output 4.2.
Private sector	Charging station oper ator(s) (to be identifie d)	· Owns suitable space for chargi ng sites e.g. petrol stations in Freeto wn with an undisrupted supply of po wer. (At least partly powered by rene wable energy)	· Proposed responsibilities: (1) to provide site(s) for charging st ations; (2) to take over the cost of non-elec trical equipment for the charging st ations (4) to ensure the smooth operation of the charging units, and

			(5) to collect charging fees.
Financial institutions	ACTB Savings and Loans	· Local bank that gives out loans to finance the purchase of 3-wheelers for individual owners and investors.	· To provide advice and technical support in particular with regards to the development of business models and finance schemes under Component 3.
Financial institutions	Rokel Commercial Bank	· One of the commercial banks licensed by Bank of Sierra Leone, the national banking regulator.	· The bank will be engaged at project inception to discuss the possibility of giving out a soft loan at a subsidized interest rate with a longer payback period to the private sector partner to facilitate the financing of the electric 3-wheelers for Component 2. · To advise on Output 3.2 - Fiscal policies and regulatory schemes to incentivize the uptake of electric mobility are developed
Civil Society Organization	Keke riders union	· A union that represents the commercial drivers of kekes in Sierra Leone	· To advise with regards to the development of business models and finance schemes under Component 3. · To advise on all activities under Component 3.
Civil Society Organization	Women's Network for Environmental Sustainability (WoNES)	· A local NGO mandated to have more women and communities engaged in articulating, designing and implementing measures to minimize the effects of climate change and environmental degradation in Sierra Leone.	· To be invited to advise on the implementation of the Gender Action Plan. · To be invited to provide inputs to the gender-inclusive national e-mobility strategy
International Organization	World Bank	· Manages the ongoing World Bank project "Integrated and Resilient	· To coordinate with UNEP under Component 3.

		Urban Mobility Project (USD 52 mil)"	
GEF Agency	United Nations Environment Programme (UNEP) - Sustainable Mobility Unit (SMU)	· The UNEP SMU is the lead Executing Agency of the Global E-mobility project and is also leading the Africa Support and Investment Platform of the programme.	· Provides a grant of approx. USD 60,000 towards the procurement of a charging system under Component 2 · The project will also benefit from the services and trainings offered by the Africa Support and Investment Platform. · In addition, the SMU will be providing execution support to the project, as outlined in the OFP's letter in annex N-2.

In addition, provide a summary on how stakeholders will be consulted in project execution, the means and timing of engagement, how information will be disseminated, and an explanation of any resource requirements throughout the project/program cycle to ensure proper and meaningful stakeholder engagement.

Stakeholders will be consulted during project implementation as following:

- Government stakeholders will participate as members of the Project Steering Committee (PSC, meetings foreseen at least once per year) and in Thematic Working Groups as appropriate.
- The privates sector and civil society stakeholders will participate in the Thematic Working Groups as appropriate.
- Selected government and private sector stakeholders will be appointed by the Steering Committee to participate in the Global Programme events as appropriate

Select what role civil society will play in the project:

Consulted only; Yes

Member of Advisory Body; Contractor; No

Co-financier;

Member of project steering committee or equivalent decision-making body;

Executor or co-executor;

Other (Please explain)

3. Gender Equality and Women's Empowerment

Provide the gender analysis or equivalent socio-economic assesment.

Gender analysis:

According to the United Nations Population Fund (UNFPA), the population of Sierra Leone is very young with people under the age of 14 making up 41 percent of the entire population[1]. The total fertility rate remains high at 4.2 children per woman though gradually declining. Sierra Leone has the 18th highest rate of child marriage in the world at 39 percent. In terms of education, less than half of the population receives secondary education. The gender gap in literacy rate remains large in Sierra Leone, especially among people aged 25 to 64 years, at 35 percent for men and 15 percent for women.

When it comes to economic status, women are less likely to be employed and more likely to live below poverty lines even when employed. Among the 15-24-year age group, labour participation for women is about 10 percent higher than then men, however, this trend is reversed in the older age groups. The percentage of the working population living below the national poverty line (USD 1.90) is very high for people in Sierra Leone but is higher for women for all age groups, and stands at 47 percent for people aged 25 and above and 57 percent for people aged 15-24 years.

Due to the more affordable fares, women rely on 2&3-wheelers more than men. As most women in Sierra Leone are homemakers they often have to carry groceries and children with them. According to a survey on motorcycle use in rural Sierra Leone, among the residents of Bombali-Woreh Bana and Moyamba-Gondama regions, women passengers outnumber men in motorcycle use by a big margin of around 20 percent (51.1 percent and 54.8 percent of the survey respondents versus their male counterparts accounting for 35.5 percent and 30.7 percent respectively[2]).

Women are also beneficiaries of improved mobility coming from lower costs of mobility and comfort that kekes provide, often more so than men. For pregnant women especially, increased number of motorcycles and 3-wheelers present better access to nearby hospital or clinic promptly, contributing to improving maternal health. Small markets across the country are largely dependent on the connectivity bridged by these two major modes of passenger transport. Many rural women, in particular, now can both carry out household and child-care duties while participating in small trades thanks to the improved connectivity (Africa Community Access Partnership, 2018).

Kekes are also a good affordable and more comfortable alternative to motorcycles which are characterised by often aggressive and careless driving styles of predominantly male motorcycle drivers. This is because the kekes' speeds are lower and the dimensions of the vehicle provide more space and prevent drivers from driving irresponsibly. In addition, the participation of female drivers, especially in the motorcycle sector, is likely to be met by resistance from male-

dominant rider's unions which are profit-driven and highly policitised. On the other hand, keke drivers' unions in Freetown, despite still mostly male, are still rather new and are better organised.

Many factors contribute to women's underrepresentation in the passenger transport sector as drivers[3]. First, women are expected to stay at home to carry out domestic duties such as cooking and childcare. Second, strong gender stereotypes in Sierra Leone proliferate the notion of women being less brave and strong than men and therefore unfit to be a driver. Third, women have less access to financing to allow them to buy a motorcycle and become a driver themselves. Few investors are willing to enter into a work-and-pay agreement with a woman due to a common perception against women owning a business.

Lastly, women and children are also known to be more susceptible to the harmful health impacts of bad air quality than men, and thus benefit from the air quality improvements that this project will trigger. When pregnant women are exposed to air pollution, it can affect foetal brain growth[4]. Shifting the large fleet of cheap and polluting conventional motorcycles to clean and efficient electric motorcycles can improve maternal health in Sierra Leone. This is especially true for female street vendors and women shopping at street markets, who are directly impacted by exhaust fumes of 2&3 wheelers, which among other things are particularly rich in carcinogenic volatile organic compounds.

Gender Action Plan:

In line with Pillar 8 of Sierra Leone's five-year development plan's focus on women's empowerment, the project will seek to disaggregate data collection to capture gender-based differences in trip patterns and other characteristics, and to ensure women are included in all awareness-raising activities, decision making and capacity building so that they reap the socio-economic and health benefits of shifting to cleaner technology to the same degree as men do

The Chief Technical Advisor (CTA) will be responsible for implementing and monitoring the Gender Action Plan during project implementation. The concrete activities and means of verification to achieve the above as well as responsible parties are summarized in the following table:

Table 3 Project gender action plan

Project Components / Outputs	Objectives	Activities	Target / Means of Verification	Respon-sibility
Overall Project Management	Promote women representation in participatory and decision-making processes and emp	Prepare a 2-pager guideline on gender representation document for all participatory and decision-making bodies and capacity building measures of the project. The guidelines provide mea	Gender Representation Guidelines document drafted and issued by the end of Month 3	CTA with support from the Ministry of Gender and Children's Affair

	ocesses and emp owerment of wom en	e project. The guidelines provide mea sures to ensure a balanced represent ation of women in these bodies. The guidelines are prepared in collaborati on with the Ministry of Gender and C hildren's Affairs and are disseminate d to the gender focal points from res pective ministries to be appointed.		ildren's Affair s
	Monitor women's participation in pr oject meetings, tra inings and worksh ops	Develop an attendance sheet templat e to collect gender-disaggregated par ticipants data, to be used in all projec t meetings, training and workshops.	Attendance sheet templa te prepared and ready to be used by the end of Mo nth 2	CTA
	Mainstream gend er into progress re porting	Report on the project's gender mainst reaming activities in each progress a nd Project Implementation (PIR) repo rt.	2 reports per year (1 progress report and 1 PIR)	PMU
Component 1 **Output 1.1**	Ensure women's r epresentation in p roject bodies	Based on the Gender Representation Guidelines, encourage member entiti es of the national coordination body t o appoint women as their representat ives.	The national coordinatio n body has at least 30% f emale members (gender-disaggregated at tendance sheets)	PMU
Component 1 **Output 1.2**	Ensure that the na tional e-mobility st rategy considers g ender aspects in a n equitable manne r	The national strategy to promote low-carbon e-mobility in Sierra Leone will include a gender analysis and action plan to mainstream gender equality ri ght from the beginning of the develop ment process. Gender-related action i tems will be included in the draft nati onal e-mobility strategy.	1st draft of gender-sensit ive national strategy (deli verable 1.2.4) prepared b y Month 16. Final gender-sensitive na tional strategy (deliverabl e 1.2.5) prepared by Mon th 24.	PMU togethe r with the e-m obility policy and strategy expert
Component 1 **Output 1.3**	Empowerment of women through p articipation in regi onal / internationa l events	Based on the Gender Representation Guidelines, participation of women in regional/international events, meetin gs and trainings will be promoted acti vely. The agencies or institutions that will be invited to participate will be en	At least 30% of participa nts attending the events are women. (gender disaggregated at tendance sheets)	PMU

		will be invited to participate will be encouraged to nominate women to participate in the events.		
Component 2 Output 2.2	Assess the ratio of women using the demonstration assets (e-kekes)	As part of the monitoring and data collection work to be undertaken under Output 2.2, the project will also monitor the use of the demonstrated e-kekes by gender.	The final report on the demonstration results (deliverable 2.2.5) includes the statistics on the use of the e-kekes, disaggregated by gender – by Month 36.	PMU
All Components	Promote women participation in project consultation meetings / workshops.	The participation of female representatives will be encouraged in all project consultation meetings and workshops outlined in the Workplan (refer Annex L for more details)	At least 30% of participants attending the project consultation meetings/workshops are women. (gender disaggregated attendance sheets)	PMU

In addition to above, the following considerations could be further explored during project implementation:

1) The project could also consider the specific needs of women in terms of the procurement of the demonstration vehicles to be able to prioritise women's comfort, dignity, and safety. A shift to electric kekes will have to ensure the identified challenges of women in terms of employment in the transport sector are fully considered through exploring opportunities for women as drivers, charging solution providers, auto mechanics, fleet operators, etc.

2) The project could explore ways to improve access to finance for women will be also investigated. Since the project aims at developing a financial mechanism for the purchase of electric kekes used as taxis, this could be particularly interesting for the rural areas of Sierra Leone where electric motorcycles could be used for the transport of agricultural and other goods to and from markets.

[1] United Nations Population Fund (UNFPA), https://www.unfpa.org/data/SL accessed February 2020

[2] Gender Mainstreaming in the Motorcycle Taxi Sector in Rural Sierra Leone and Liberia, Africa Community Access Partnership (AfCAP), 2018

[3] Gender Mainstreaming in the Motorcycle Taxi Sector in Rural Sierra Leone and Liberia (Africa Community Access Partnership, 2018)

[4] How air pollution is destroying our health: https://www.who.int/airpollution/news-and-events/how-air-pollution-is-destroying-our-health, WHO. 2018

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment?

Yes

Closing gender gaps in access to and control over natural resources;

Improving women's participation and decision making Yes

Generating socio-economic benefits or services or women Yes

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Elaborate on private sector engagement in the project, if any

Private sector involvement plays a crucial role in the project as the public transport services in Sierra Leone are provided largely by the private sector. The names and roles of key private sector actors are contained in Table 2. The private sector will also engage in the stakeholder consultations undertaken as part of Output 1.2. Overall, the project will engage the private sector in the following ways including:

- Demonstration of electric kekes: This will be piloted by an existing local taxi operator which provides an app-based ride-hailing. Taptap is one such example and has shown strong interest and support for the project. The project seeks close collaboration with the private sector companies and the technical staff of Taptap could participate in several deliverables related to the purchase, operation, maintenance, and monitoring of electric kekes.
- Battery charging/swapping: The project is currently considering several business options for battery charging, including working with a local petrol station operator for the provision of charging sites. The solar mini-grids operators will be engaged as a potential partner in this regard. Through the Ministry of Energy, the project aligns itself with the renewable power projects that are implemented during the project timeframe in Sierra Leone, including Freetown Solar Park.
- Financing e-mobility: The project will engage closely with the financial sector to investigate favourable loan conditions for the private sector partner related to the demonstration project under Component 2. Discussions were held between EPA-SL and Rokel Commercial Bank in regards to the possibility of providing a loan to a private-sector vehicle operator at a preferential rate to fund the incremental cost of the demonstration vehicles. Further, the project held extensive consultations with a private financial institution, ACTB Savings and Loans, which will also be invited to provide technical inputs as potentially part of the e-mobility coordination body, based on their experience in giving out loans to youth drivers for conventional keke purchases.
- Battery waste management: The project will also identify and engage private sector partners in Sierra Leone's existing solid waste collection industry to formulate a viable EV battery waste management scheme (Output 4.2).

5. Risks to Achieving Project Objectives

Elaborate on indicated risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and, if possible, the proposed measures that address these risks at the time of project implementation.(table format acceptable):

Table 4 Risks and mitigation measures

Risk description	Main categories	Risk level rating	Risk Mitigation Strategy and Safeguards	By Whom / When?
The e-kekes might not perform as planned	Technical	Moderate	Good refund policies to be considered and/or negotiated when procuring the vehicles. Drivers to be given training and a manual for e-kekes. Finally, the project has budgeted USD 10,000 for spare parts for the demonstration vehicles.	PMU, Private sector partner, year 2-4
An e-keke might have an accident, leading to negative press	Technical	Low	As part of Output 2.2, the fleet operator and drivers are to be given an easy-to-use inspection checklist for daily inspections each day before use to avoid preventable accidents.	EPA-SL, year 2 to 4
Negative perceptions about e-mobility technology and the impacts this will bring to society and industry.	Political	Low	Capacity building of government, private sector, and civil society stakeholders in Global Programme Events & implementation of the demonstration project	Government of Sierra Leone, year 1 to 4
The growing demand from electric vehicles destabilizes the power supply	Technical / Economic	Low	The introduction of e-mobility in Sierra Leone starts with only a few electric 3-wheelers, which have a moderate power consumption and the scale-up of this vehicle segment aligns with the expansion of renewable power generation capacity outlined in Sierra Leone's national energy policies	Electricity Generation and Transmission Company (EGTC). Electricity Distribution and Supply Authority (EDSA). private sector stakeholders, after project implementation

Leadership change: change in leadership and priorities in the government	Political / Institutional	Moderate	The political risk is Moderate in light of the country context and the current global situation. Sierra Leone held general elections on March 7, 2018 to elect a new President. The ruling party has a majority by a very slim margin. The national coordination body will seek to institutionalize the involvement of the different ministries during and beyond the life of the project.	National coordination body, Government of Sierra Leone, year 1 to 4
Higher upfront cost of electric vehicles may pose a barrier to implementation and scale up of activities	Economic	Moderate	The project includes the development of a financial mechanism to lower the burden of higher upfront costs and to make the lower total cost of ownership accessible to electric 3-wheeler operators.	Private sector stakeholders, year 2 to 4
Objection or low commitment from industry and lack of interest or participation from market players/private sector.	Political / Economic	Moderate	The Global Programme works together with electric vehicles manufacturers to create an understanding of the market size and requirements of electric motorcycles in West Africa.	Government of Sierra Leone and private sector stakeholders, year 1 to 4
Insufficient and incomparable systems for tracking results	Capacity / Technical	Low	The project is part of a Global Programme that has tracking systems in place and which provides technical support to build the necessary capacity in the country.	Government of Sierra Leone, year 1 to 4
Time lag of results: Major results of the project may not be seen before the end of the project period	Political	Moderate	The project team will identify interim goals for each engagement to track progress and will develop leading indicators of project results. The project includes both strategy and resources for performance management, knowledge management and information dissemination components. This will help ensuring that results of the projects will have early visibility. Regarding the visibility of the results of O	Government of Sierra Leone, year 1 to 4

eriod.			Regarding the visibility of the results of Co mponent 3 and 4, the inter-ministerial body (i.e. Coordination Body and PSC) should be empowered and encouraged to generate co nsensus on benefits of low-carbon electric mobility to generate a good momentum for adoption of the developed schemes and po licies.	
Lack of linkages with a vailable funding/financi ng for EVs fleets.	Financial	Substanti al	The project will work closely with the local financial institutions to develop financing m echanisms for electric mobility. So far, the project has identified interests from ACTB Savings and Loans, a private bank offering l oans for kekes and Rokel Commercial Ban k, Sierra Leone's biggest commercial bank who have been consulted regarding their ro les in this. Beyond that, the project will receive appropr iate training and networking opportunities on financing through the support provided by the Global Electric Mobility Programme's African Support and Investment Platform.	Government of Sie rra Leone in consu ltation with the fin ancial sector, Afric an Support and Inv estment Platform, year 2 to 4
Poor sustainability of t he project results and a lack of ownership of th e program after the end of the GEF funded activ ities and inability to so urce resources to conti	Political / Fin ancial	Low	To promote ownership of project outputs, t he project will closely engage with local sta keholders from the public and private secto rs as well as civil societies in the technical and economic feasibility analysis, business and finance models, the setup of procurem ent guidelines for the pilot fleet, and the de velopment of policy proposals. In this way, the project will ensure that stakeholders en dorse the deliverables of the projects. To promote the ownership of the demonstr ation vehicles during and after the project, t he GEF fund will only finance the increment al cost of the vehicles with the rest to be fin anced by the private sector partner.	Government of Sie rra Leone, year 2 t o after project fina lisation

nue the program's activities in the medium/long term			Beyond that, consideration for the sustainability of the project results are integrated into the project, with the Outputs under Component 3 and 4 dedicated to ensuring the scale-up and longer term environmental sustainability of e-mobility in Sierra Leone. Finally, the e-mobility coordination body that will be institutionalized during the life of the project under Component 1 is meant to live and continue functioning beyond project completion.	
Higher electricity use might lead to higher emissions, e.g. from HFO plants	Environmental	Low	The carbon footprint of the power mix in Sierra Leone is relatively low with many investments ongoing to expand the integration of additional renewable power generation capacity to the national grid.	Government of Sierra Leone, year 2 to after project finalization
Materials from EVs (e.g. from batteries) might generate environmental pollution	Environmental	Moderate	Development of a scheme for recycling and tracking of these materials are integrated into the project under Component 4.	Government of Sierra Leone, year 2 to after project finalization
Stakeholder interest is low in re-use and disposal of EV batteries	Political / Environmental	Low	Explore various options for EV battery second life, including both government and private-led solutions. In addition, the UNEP Sustainable Mobility Unit (SMU) will closely engage the Economic Community of West African States (ECOWAS) to mobility political support for this issue, with a view to present Deliverable 4.2.3 (scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries) to the ECOWAS community through formal discussions to pursue the development and adoption of such a policy at the sub-regional level.	PMU, During the implementation of Component 4
The project faces political / institutional resistance to appoint female			The project has a Gender Action Plan with clear gender mainstreaming activities, indicators, targets and means of verification.	

ance to appoint female representatives in the coordination body and to select female participants for the trainings, events and workshops.	Political / Institutional	Moderate	The Chief Technical Advisor will be responsible for implementing and monitoring the Gender Action Plan. The CTA may raise his/her concerns on the project's compliance with the Gender Action Plan during the annual Steering Committee Meetings.	CTA, years 1 to 4
Charging stations face operational challenges	Capacity / Technical	Moderate	To ensure the smooth operation of charging station operation, mitigation measures will be in place including formal project agreements, technical training of operators and drivers, and the development of manuals. The Chief Technical Advisor will be responsible for overseeing the implementation of the demonstration project, with the support of the UNEP SMU for the procurement and installation of the charging infrastructure.	CTA, UNEP SMU, private sector partners, years 2-3
Climate risk: there is an increased risk of extreme weather events in Sierra Leone, such as floods and heavy rains, leading to landslides which can cause damage of charging stations.	Environmental	Low	While this risk itself is beyond the control of the project, careful project planning with buffer times can help reducing delays due to unexpected events. In Component 2, in locating the charging stations and selecting the vehicle models, weather and natural disaster factors will need to be factored in to avoid the damages from floods, landslides and heatwave, among others. Please refer to the detailed climate risk screening in the paragraphs below for further details.	PMU, years 1 and 2

Climate Risk Screening

(i) How will the project's objectives or outputs be affected by climate risks over the period 2020 to 2050, and have the impact of these risks been addressed adequately?

Sierra Leone is located in West Africa between the Republic of Guinea and the Republic of Liberia. The western border spans along the Atlantic Ocean. Coastal plains, lowland plains, plateaus, hills, and mountains characterize the geography of Sierra Leone. It is this varied topography of Sierra Leone that gives the country a hot and humid tropical climate that varies across the coast and inland. The dry season, November to April, is prone to dusty and hot Harmattan winds and drought conditions. Average temperatures range between 25 and 27°C, with lower temperatures (22–25°C) during the rainy season. High dependence on agriculture and natural resources, compounded by high rates of poverty, and environmental degradation, leaving Sierra Leone vulnerable to climate change impacts.

1. Hazards

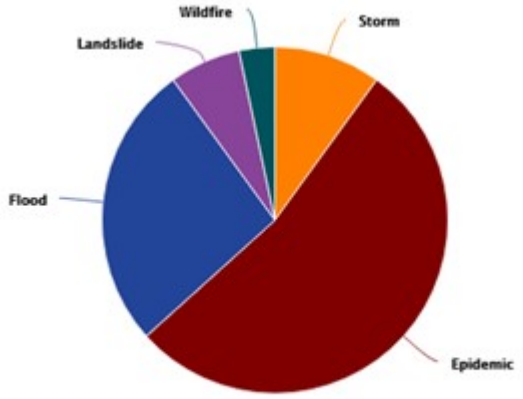


Figure 12 Average annual natural hazard occurrence for 1900-2018

(Source: World Bank Climate Change Knowledge Portal)

The chart from the World Bank below provides an overview of the most frequent natural disaster in Sierra Leone. Besides epidemic, floods by far were the more frequent natural hazards between 1900 and 2018, followed by storms, landslides, and wildfires.

Increases in the intensity of rainfall events exacerbate the existing impacts of floods, which include loss of life and property as well as damage to critical service and transport infrastructure. Rising sea levels, on the other hand, also pose a risk of causing damage to coastal areas including industrial infrastructure. Floods account for 85 percent of disaster-related mortality in the country, followed by landslides and storms.

1. Vulnerability and exposure

According to the World Bank's Climate Change Knowledge Portal[1], Sierra Leone's key vulnerabilities to climate change are directly related to its rising temperatures, sea level rise, more intense rainfall events including storms, and floods:

- Storms and in particular Squall Lines brings thunderstorms and strong winds, are a frequent natural hazard between April and June. These storms have caused damages to communications and transportation infrastructure, as well as people's homes and agriculture, while also causing coastal erosion.
- Sea level rise will cause the coastal regions of Sierra Leone to see more frequent coastal floods, and increasing average precipitation levels and intense rainfall events may induce more flooding and increase streamflow rates.
- Additionally, flooding can affect the quality and quality of water resources increasing the likelihood of waterborne diseases, especially in concert with unsafe drinking water.

In the project context, the primary risks come from changes in precipitation, which leads to extreme weather events including high rainfall and droughts. Both have a moderate to low potential to affect the project's outcomes and outputs. Heavy rainfalls can lead to flooding and landslides, damaging electric vehicle charging infrastructure, power grid infrastructure, and general road infrastructure. More frequent flooding events and power supply outages can be expected which can affect the economic viability of charging infrastructure. Increased temperatures pose a risk of damaging the equipment, and can hinder overall vehicle performance.

2. Measures to manage the risk:

The main climate change risks in Sierra Leone are[2] (1) flooding risks for charging infrastructure due to increased frequency and intensity of heavy rainfall events, (2) impacts of strong winds on charging infrastructure and demonstration vehicles, and (3) impacts of rising temperatures and heatwaves on charging infrastructure and vehicles and battery performance.

However, such risks are not regarded a high risk to the project implementation as long as mitigation measures are in place for siting charging stations and choosing appropriate technologies (vehicles, batteries, and charging equipment). Mitigation measures will be incorporated in the project design when (a) selecting the location for charging stations, and (b) selecting the charging equipment, based on the climate risks identified above. Furthermore, pilot drivers and operators will be trained as part of the driving safety protocol on safe usage of electric vehicles and charging equipment.

(ii) Has the sensitivity to climate change, and its impacts, been assessed?

The flooding and wind risks should be factored in to prevent potential damages when choosing the location for the pilot infrastructure from flooding and extreme winds. The project will mitigate the heat risks by selecting adequate heat-resistant technologies.

(iii) Have resilience practices and measures to address projected climate risks and impacts been considered? How will these be dealt with?

The overall goal of the project is on building climate resilience by reducing the country's dependence on fossil fuel imports through the uptake of electric vehicles. Thus, the project is directly contributing to the overall climate resilience of Sierra Leone.

(iv) What technical and institutional capacity, and information, will be needed to address climate risks and resilience enhancement measures?

Technical capacity should be able to address climate risk needs to incorporate the knowledge to assess flooding history of the potential locations for charging infrastructure. Beyond that, the technical design of the solar panel and vehicle charging installations will need to be in accordance with the latest building codes, to ensure resilience to extreme weather events (primarily extreme wind speeds, see discussion above).

Institutional capacity should be able to receive detailed information about the reliability of power supply for selected EV charger locations. Operators of and institutions operating the solar panel and vehicle charging installations will need the capacity to understand how to operate the systems during and after extreme weather events, especially in the event of power disruptions.

COVID-19 Risk and Opportunity analysis

The COVID-19 pandemic presents several challenges but also highlights the valuable benefits of electric mobility, in particular in the field of public health, and therefore the Sierra Leone Electric Mobility Child Project has an opportunity for larger impact by starting now. According to today's knowledge, long-term exposure to particulates could be linked to up to 15% of global COVID-19 deaths. Other studies suggest that besides, particulates (e.g. PM2.5, PM10), N2O from both mobile (e.g. trucks and cars) and stationary emission sources can be a multiplier of COVID-19 impact. Since electric mobility has the potential to significantly contribute to improving urban air quality, this project is a timely move in Sierra Leone's efforts to respond to the COVID-19 pandemic. Similarly, a shift to electric mobility will significantly reduce the dependency of Sierra Leone on petroleum fuel imports. It therefore increases resilience against restrictions or oil price spikes resulting from international crisis. Furthermore, in terms of green recovery, clean mobility is expected to play a key role in getting the country's economy back on track. Continued social distancing measures will have an impact on how transportation services are used, and certain modes such as 2&3-wheeler taxis, or usual

taxis and ride-hailing providers using passenger cars, are likely to see increased use to reduce close contact with higher numbers of riders in larger and cramped vehicles. For many of these modes good electric alternatives are already available. Below is a risk and opportunity analysis of the Covid-19 situation in relation to the Sierra Leone e-mobility project:

Risks:

The COVID-19 pandemic has the potential to affect the project in the following ways:

Reduced keke operations. The responses to COVID-19, ranging from social distancing, teleworking to lockdowns have significant implications for the continuity of transport services in Sierra Leone both from the demand and supply perspectives. Firstly, users will have to modify their mobility needs either for concern on reducing the physical moves but also because users will less likely afford them. Secondly, keke drivers and operators could suffer a reduction in income, and hence adopting new technologies such as electric vehicles might not be their priority. This would negatively impact the effective execution of the project's outputs, potentially leading to slower adoption of electric kekes in Freetown.

Lockdowns and movement restrictions. Mobility restrictions and the need for social distancing would make it difficult to organise physical events that have traditionally benefited from in-person interactions, such as workshops, meetings, training, and consultations.

Changes in government priorities. With the national focus on addressing the pandemic and its impact on the national economy, commitment to electric mobility might be impacted. Financial incentives such as favourable import taxes or exemptions for EVs and charging equipment might not gain enough political support.

Mitigation measures:

Reduced taxi and minibus operations. If the pandemic continues to hamper the implementation of the project activities, especially Component 2 which is scheduled to take place in 2021 and 2022 with lockdowns and travel restrictions continue to impact the country, the PMU will re-evaluate the project work plan to reschedule field activities until the second or the third year (2022-2023). Additional health and safety protocols for the drivers will need to be put in place to minimize the risks of spread. Where possible, the capacity development components of the project, also in collaboration with the Ministry of Transport, could be used to support the development of pandemic response protocols/roadmaps for transport operators.

Lockdowns and movement restrictions. In the event of travel and mobility restrictions and social distancing, events will be rescheduled or held online. The government of Sierra Leone has used teleconferencing and therefore is already familiar with required arrangements.

Changes in government priorities. Project activities requiring the government's endorsement of laws and decrees are to take place primarily for the project's second and third year when it is estimated that action on the pandemic will be in place and less of a requirement for legislative authorities. If the pandemic continues to be requiring the attention of decision-makers, such project activities will be rescheduled for the project's third year.

Opportunities:

I*ncreased awareness about cleaner urban air:* As the GEF project directly contributes to improving urban air quality through a reduction of air pollutants coming from internal combustion engine vehicles, the project can take advantage of this growing global voice demanding cleaner urban air. What needs to be ensured is that this leads to not only better awareness in the public and among decision-makers but also to concrete actions.

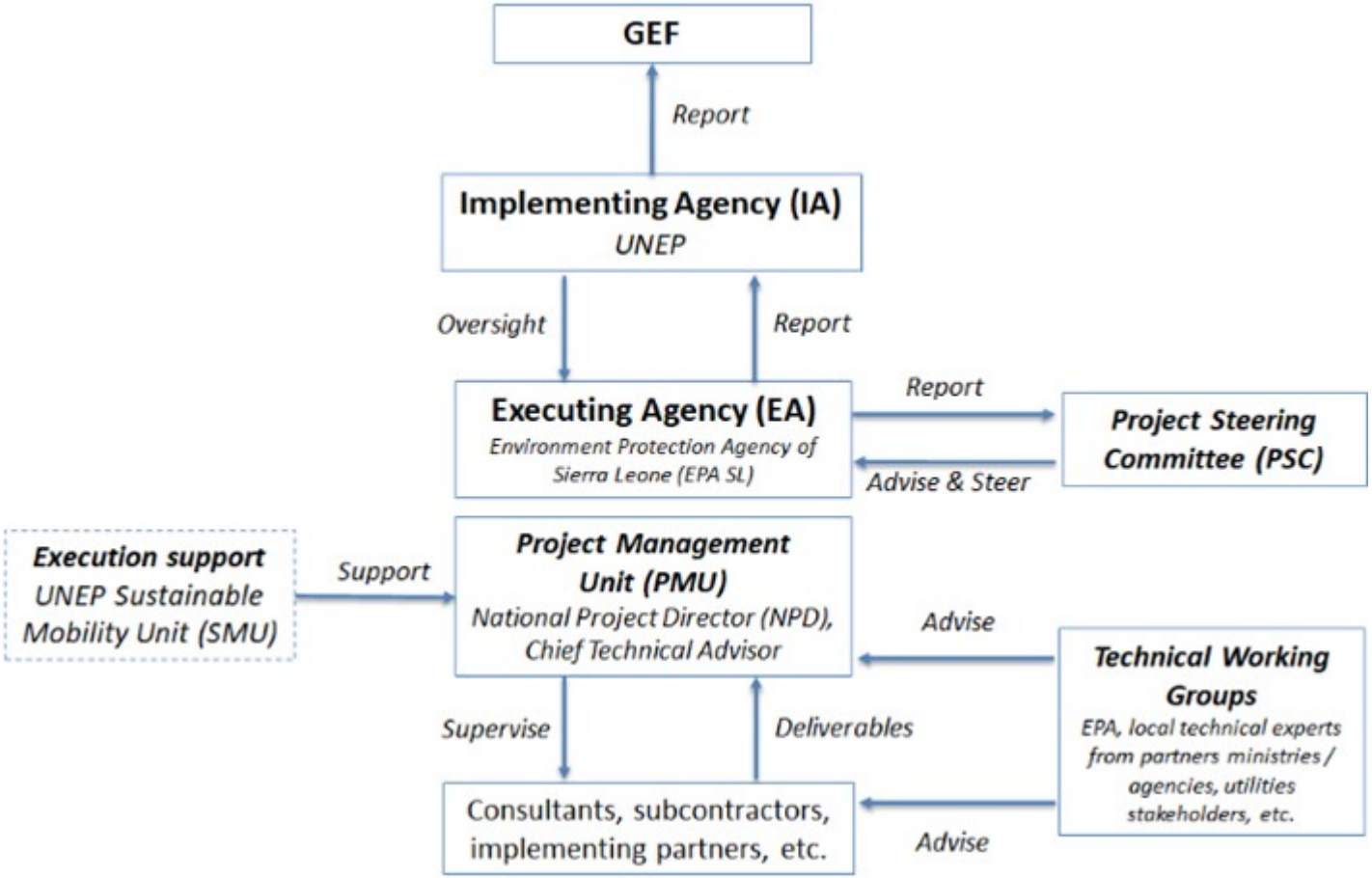
Budget savings and reallocation: It is likely many if not most of the project's events would have to be held virtually. Budget savings made from the unused traveling and venue costs could be reallocated to more substantive activities, which would be decided depending on project needs.

[1] https://climateknowledgeportal.worldbank.org/country/sierra-leone

[2] Climate Change Risk Profile: Sierra Leone (USAID, 2016)

6. Institutional Arrangement and Coordination

Describe the institutional arrangement for project implementation. Elaborate on the planned coordination with other relevant GEF-financed projects and other initiatives.



Institutional arrangements:

This project is funded by the GEF and co-financed by the EPA SL, the Ministry of Transport and Aviation, the Ministry of Energy and. UNEP will be acting as the GEF Implementing Agency and the Environment Protection Agency of Sierra Leone (EPA SL) will be the project's Executing Agency.

Refer to Annex K for further details on the roles and responsibilities of the Implementing and Executing Agencies.

The main project bodies are the following (refer to Annex K for more details):

A Project Steering Committee (PSC) will be established to provide overall guidance and oversee the progress and performance of the project as well as to enhance and optimize the coordination and contribution with various project partners. The PSC will be chaired by the National Project Director (NPD, EPA-SL) and will convene at least once per year. The PSC will include members from (but not limited to) the EPA-SL, the Ministry of Transport and Aviation, the Ministry of Industry and Trade, the Ministry of Environment, the Ministry of Energy, The Ministry of Industry and Trade, The Ministry of Finance, the Ministry of Gender and Children's Affairs and the Freetown City Council. The Africa Support and Investment Platform Coordinator of the global e-mobility project will also participate in the PSC, most likely through remote attendance. In addition, during the inception phase of the project, the Project Management Unit will suggest the inclusion of other Ministries and national agencies as part of the the PSC, as well as key stakeholders from the private sector and civil societies.

Project Management Unit (PMU) will be overseen by a National Project Director (NPD) assigned (on a part-time basis) by the EPA-SL and led and managed on a day-to-day basis by the CTA in close collaboration with the NPD. The PMU will be responsible for day-to-day project operations of the project. The Chief Technical Advisor will also support the development of studies, analyses and datasets and will support the national and international experts during project implementation.

Its responsibilities include:

- managing field operations;
- managing project information and documentation and distribution of project reports, and training materials to relevant stakeholders;
- managing project M&E and assisting the CTA to prepare biannual project progress reports; acting as secretariat to the PSC;
- handling day-to-day project issues and requirements, coordinating project interventions with other on-going activities and ensuring a high degree of inter-institutional collaboration;
- ensuring the timely delivery of inputs and outputs;
- preparing and submitting to the PSC and UNEP project progress reports on outputs and outcomes achieved, financial statements, annual work programme, and detailed budget.

Ad-hoc Technical Working Groups (TWG) will be formed to facilitate the implementation of the project components. These will include working groups on:

1. E-mobility technology, including experts from the local private sector taxi fleet operator hosting the demonstration project as well as the local petroleum fuel distributor hosting the charging stations;

2. E-mobility policy and finance: representatives from the local financial institutions providing the loan for the financing of the e-keke's conventional price equivalent, among others;
3. E-mobility and sustainability, including representatives from EPASL, Ministry of Transport and Aviation Ministry of Transport and Aviation and the Ministry of Energy, among others.

The TWG will meet regularly during project implementation.

At the request of Sierra Leone's GEF OFP and the EPA-SL (refer to letter appended in Annex N-2), UNEP's Sustainable Mobility Unit (SMU) will also provide **targeted technical support** to the project, including (but not limited to) (1) the procurement of the electric vehicles, (2) the recruitment and contracting of international experts, (3) facilitating discussions among the Ministries and project stakeholders, and (4) technical troubleshooting.

Justifications for the targeted technical support to be provided by UNEP's Sustainable Mobility Unit are as follows[1]:

For Outputs 1.2, 3.2, 4.1, 4.2:

- The recruitment and contracting of international experts: to ensure the project receives the best technical support available in the field of electric mobility which is still quite a new concept, the UNEP SMU's support will be required to ensure experts with adequate qualifications are on board.
- Facilitating political and technical discussions among the Ministries and project stakeholders; while EPA-SL is well-positioned to coordinate with the Government entities, the UNEP SMU's support is needed to assist the political and technical discussion both at the national and sub-regional level through the collaboration with ECOWAS (especially Output 4.2).
- Technical troubleshooting: EPA-SL, the executing entity, currently does not have in-house expertise on the technical issues related to electric mobility, which the UNEP SMU would be able to provide.

For Output 2.2:

- The procurement of the demonstration vehicles: UNEP's SMU support is needed to minimise risks associated with introducing new technology with little to no prior experience dealing with electric vehicles in the executing entity. As there is currently not enough market interest to bring electric 3-wheelers in Sierra Leone, the UNEP SMU is currently linking with other countries in the region to achieve economies of scale that are big enough for manufacturers' interest. Choosing the right dealership is crucial in sustaining the success of the demonstration components of the project.

Further details on the targeted technical support to be provided by the UNEP SMU can be found in the annex on Project Implementation Arrangements (Annex K), the project Workplan (Annex L) and the Terms of Reference (Annex H). In particular, the detailed list of deliverables to be supported by the UNEP SMU can be found in the Terms of References of the "*International E-mobility Technical Support (UNEP SM Unit)*" position, located in Annex H of the CEO Endorsement Document.

Coordination with other initiatives:

As described above, this project will work closely with the GEF Global Electric Mobility Programme, especially through the Africa Support and Investment Platform as well as the Thematic Working Groups of the Global Programme.

In addition, the project will work together with the Global Fuel Economy Initiative (GFEI) project, which is currently implemented and aims to strengthen the data basis for the transport sector in Sierra Leone.

The GEF project will coordinate closely with the Ministry of Energy's renewable energy projects, particularly the 50MW IPP solar project (IFC, USD 50 million) and 6 MW Solar Park project (Abu Dhabi Development Fund, USD 12.6 million).

Synergies will be drawn with the "Integrated and Resilient Urban Mobility Project" (IRUMP), implemented by the Ministry of Transport and Aviation and funded by the World Bank and the Government of Sierra Leone. Extensive discussions took place between the Ministry of Transport and Aviation and the EPA-SL on linking the capacity-building activities of the IRUMP under the component "modernization and professionalization of transport services" with the capacity building work to be undertaken as part of Output 1.3 of the GEF project. This will be further explored and formalized during the inception phase of the GEF project. Please see Figure 11 for detailed components and activities of the IRUMP.

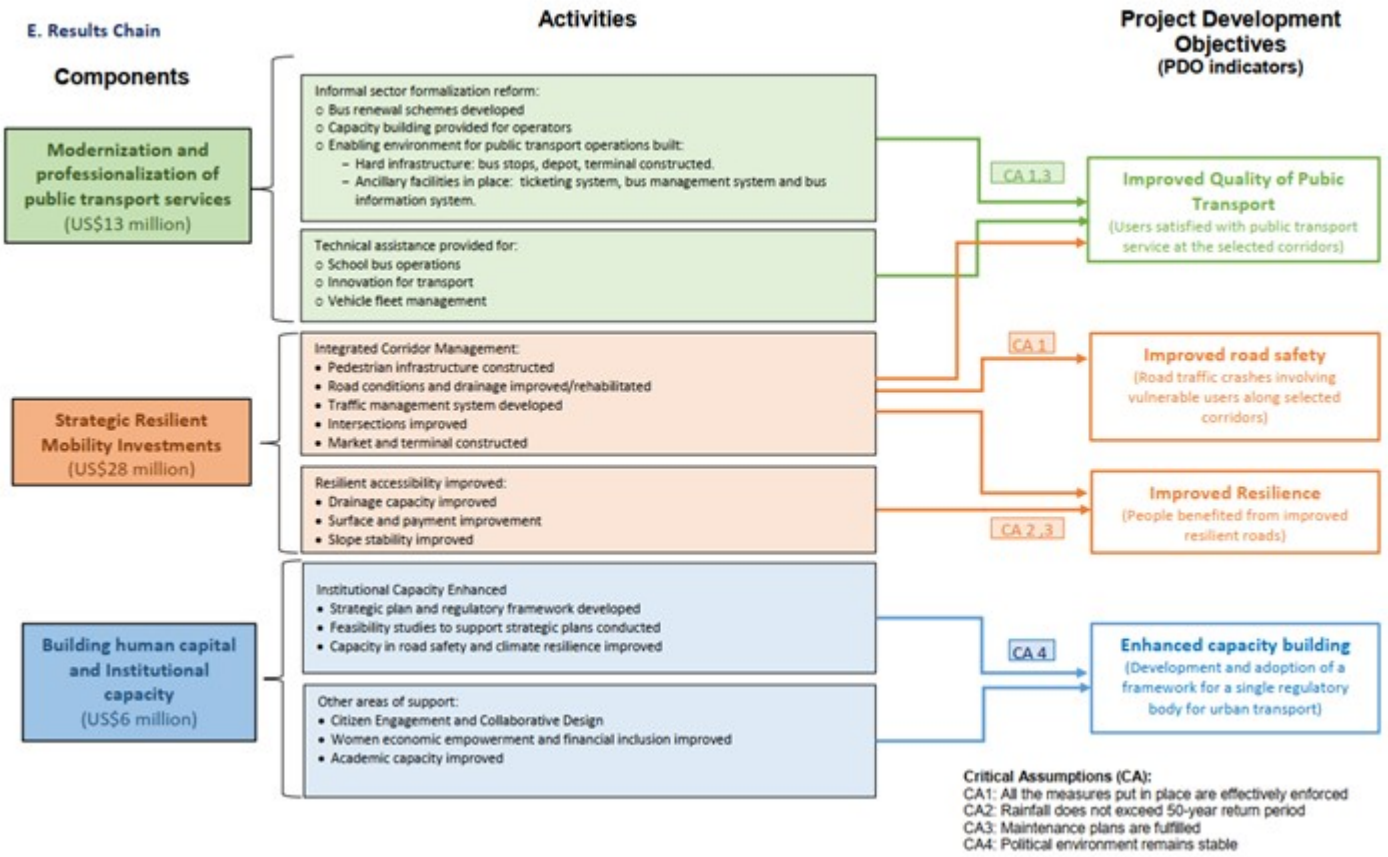


Figure 13 the World Bank “Integrated and Resilient Urban Mobility Project

Besides linking with the above efforts, the Sustainable Mobility Unit (SMU) of UNEP will closely engage the Economic Community of West African States (ECOWAS) to mobility political support for this issue, with a view to present Deliverable 4.2.3 (scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries) to the ECOWAS community through formal discussions to pursue the development and adoption of such a policy at the sub-regional level.

[1] These justifications had been provided by email to the GEF in October 2020, in order to obtain the GEF’s approval of the same before the 1st submission of the CEO Endorsement Document.

7. Consistency with National Priorities

Describe the consistency of the project with national strategies and plans or reports and assesments under relevant conventions from below:

NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc.

Conditional Mitigation Contribution:

Sierra Leone's NDC intends to maintain the emission levels of Sierra Leone below 7.58 MtCO2e by 2035 or neutral by 2050 by reducing her carbon footprint and by following green growth pathways in all economic sectors.

Sierra Leone has identified 7 priority climate change response strategies in the area of mitigation of greenhouse gas emissions. Among these, Strategy 6 states the following: Diversification of economic growth through strengthened transport sub-sector, particularly the infrastructure to contribute to the reduction of regional and global emissions of greenhouses and build a stable economy.

Current GHG emission contributions as part of Sierra Leone's "Internationally communicated pre-2020 GHG emissions reduction plans under the Copenhagen Accord" related to the transport sector are as follows:

- Development and enforcement of regulations on regular maintenance of vehicles (vehicle emission testing): formulation of transport plans.
- Improved and promoting use of public transport (e.g. road, rail and water) for passengers and cargo to reduce traffic congestion and GHG's emissions

Contribution to Sustainable Development Goals

The proposed project will contribute to achieving the below Sustainability Development Goals (SDG).

Goal	Goals and targets
SDG 3 – Ensure healthy lives and promote well-being for all at all ages	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
SDG 11 – Make cities and human settlements inclusive, safe, resilient and sustainable	11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons
	11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management
SDG 13 – Take urgent action to combat climate change and its impacts	13.2 Integrate climate change measures into national policies, strategies and planning

UN Sustainable Development Cooperation Framework (UNSCDF)

The project contributes to the outcomes and indicators of UNSDCF Sierra Leone 2020-2023, including:

· Outcome 3: By 2023, the population of Sierra Leone, particularly the most vulnerable, will benefit from increased and more equitable access to and utilisation of quality education, healthcare, energy and water, sanitation and hygiene services, including during emergencies

· Indicator 4.6.1: Number of national sectoral plans that incorporate evidence-based disaggregated gender-inclusive data

· Indicator 4.6.3: Number of MDAs and Local Councils that are generating real-time data disaggregated by sex, age, and PWDs with the use of innovation and technology

8. Knowledge Management

Elaborate the "Knowledge Management Approach" for the project, including a budget, key deliverables and a timeline, and explain how it will contribute to the project's overall impact.

The project is part of the global GEF-UNEP Programme on Electric Mobility. It will actively participate in the global programme's global and regional activities through its Component 1, for example by participating and contributing to the knowledge exchange in the Africa Regional Support and Investment Platforms, which will be hosted by UNEP, and the relevant global working groups, as well as by providing insights and knowledge.

All the knowledge products and lessons learned will be shared at three levels – at the country level (through the), in the Global Thematic Working Groups of the Global e-mobility Programme and in the Africa Regional Support and Investment Platform.

On the global level, results and knowledge products of the Sierra Leone Project will be made accessible through the Global E-Mobility Programme Online Toolbox. The Global Programme website will showcase the Sierra Leone project and report on progress. The Global Programme will also disseminate results of the Sierra Leone Project through social media, whenever relevant.

Since UNEP is hosting the Africa Support and Investment Platform, close linkages will be made between this Project and the Regional Support and Investment Platform. Also, through that platform, the Sierra Leone Project will benefit from lessons learnt and experience gained from other GEF-funded projects in the region, such as the GEF E-Mobility Projects in Côte d'Ivoire, Togo, Burundi, Seychelles, South Africa and Madagascar.

EPA-SL will be responsible for knowledge management as part of their duties as the GEF Executing Agency. The EPA-SL and the Chief Technical Advisor (CTA) will ensure that all knowledge products developed under the project will be shared with the Global Programme and in particular the IEA (for the global data repository) and UNEP (for dissemination through the Africa Support and Investment Platform).

The deliverables and approaches of the project's knowledge management activities will contribute to the successful implementation of the project as well as the sustainability and scaling up of the project impact. The tools developed, best practices collected and knowledge generated by the project will continue to be available to country and cities even after the project as UNEP will continue supporting the African Regional Support and Investment Platform so that these can continue to take the lead in supporting a shift to electric mobility in their respective regions.

The key deliverables contributing to knowledge management are summarised in the below table. The total budget for knowledge management and knowledge products is estimated at approximately US$ 114,000.

Outputs	Knowledge products produced by the project (deliverables)	Indicative timeline	Indicative Budget (US$)

Component 1			
Output 1.1	D 1.1.4 Final e-mobility coordination body report, including all best practices and lessons learned from the project	Month 44	≈4,000
Output 1.2	D 1.2.4 Draft gender-sensitive national e-mobility strategy D 1.2.5 Final gender-sensitive national e-mobility strategy	Month 17 Month 24	≈15,000
Component 2			
Output 2.1	D 2.1.3 A study to identify locations, technology and capacity of a e-keke charging (including both overnight charging and battery swapping) is developed D 2.1.4 A draft feasibility study including the development of business models for the vehicles and the charger operators as well as a finance scheme is developed and presented during workshop to the coordination body for endorsement D.2.1.5 The final feasibility study and the demonstration implementation plan including the framework for data collection, reporting, and analysis are developed	Month 8 Month 8 Month 15	≈15,000
Output 2.2.	D 2.2.1 Technical requirements of the electric vehicles and charging equipment to be procured are developed D 2.2.4 Driving manual and protocol established with operation and safety training conducted with drivers D 2.2.5 Final report on the demonstration results presented to the coordination body and to the Global Electric Mobility Programme	Month 9 Month 14 Month 36	≈20,000
Component 3			

Output 3.1	D 3.1.2 Draft vehicle import taxation proposal developed and presented at a workshop	Month 22	≈15,000
	D 3.1.3 Draft vehicle import regulation proposal developed and presented at a workshop	Month 22	
	D 3.1.4 Draft vehicle registration proposal developed and presented at a workshop	Month 22	
	D 3.1.5 Final policy package delivered and presented	Month 30	
Output 3.2	D 3.2.2 Draft financing mechanism and business models developed and presented	Month 20	≈20,000
	D 3.2.3 Final financing scheme, a procurement guideline, business models developed and proposed	Month 24	
Component 4			
Output 4.1	D 4.1.2 A draft study to integrate renewable power for electric vehicle recharging and technical standards for 2&3 wheelers are developed and circulated for review	Month 27	≈15,000
	D 4.1.3 The study to integrate renewable power for electric vehicle recharging is finalized and disseminated to all local stakeholders and the Global Programme knowledge management focal point.	Month 34	
Output 4.2	D 4.2.2 A draft scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries is developed and presented for review	Month 27	≈10,000
	D 4.2.3 The scheme for re-use, and collection for recycling and sound disposal of used electric vehicle batteries is finalized and disseminated to all local stakeholders, the coordinating body and the Global Programme knowledge management focal point.	Month 34	

9. Monitoring and Evaluation

Describe the budgeted M and E plan

Monitoring and Evaluation (M&E) activities and related costs are presented in the costed M&E Plan (Annex J) and are fully integrated in the overall project budget.

The project will follow UNEP standard monitoring, reporting and evaluation procedures. Reporting requirements and templates are an integral part of the legal instrument to be signed by the Executing Agency (EPASL) and the Implementing Agency. The project M&E plan foresees an optional Mid-Term Review (MTR) and a Terminal Evaluation (TE), worth USD 10,000 and USD 20,000, respectively. In addition, USD 2,400 have been provisioned to organize the project's Inception Workshop and the project Steering Committee Meetings. Therefore, the total M&E budget is amounting to USD 32,400. If it is decided that the Mid-Term Review is not necessary, the budget will be allocated towards a more comprehensive Terminal Evaluation.

The project M&E plan is consistent with the GEF Monitoring and Evaluation policy for Medium-Sized Projects (MSP). The Project Results Framework presented in Annex A includes SMART indicators for each expected outcome as well as end-of-project targets. These indicators along with the key deliverables and benchmarks included in Annex L will be the main tools for assessing project implementation progress and whether project results are being achieved. The means of verification to track the indicators are summarized in Annex A.

The M&E plan will be reviewed and revised as necessary during the project Inception Workshop (IW) to ensure project stakeholders understand their roles and responsibilities vis-à-vis project monitoring and evaluation. Indicators and their means of verification may also be fine-tuned at the inception workshop. General project monitoring is the responsibility of the Project Management Unit (PMU) but other project partners could have responsibilities in collecting specific information to track the indicators. It is the responsibility of the Chief Technical Advisor to inform UNEP of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely fashion.

The project Steering Committee (PSC) will receive periodic reports on progress and will make recommendations to UNEP concerning the need to revise any aspects of the Results Framework or the M&E Plan. Project oversight to ensure that the project meets UNEP and GEF policies and procedures is the responsibility of the UNEP Task Manager. UNEP Task Manager will also review the quality of draft project outputs, provide feedback to the project partners, and establish peer review procedures to ensure adequate quality of scientific and technical outputs and publications.

Project supervision will take an adaptive management approach. UNEP Task Manager will develop a project Supervision Plan at the inception of the project, which will be communicated to the Project Management Unit and the project partners during the Inception Workshop. The emphasis of the Task Manager's supervision will be on outcome monitoring but without neglecting project financial management and implementation monitoring.

Progress vis-à-vis delivering the agreed project global environmental benefits will be assessed with the Steering Committee at agreed intervals. Project risks and assumptions will be regularly monitored both by the Project Management Unit, the project partners and UNEP. Risk assessment and rating is an integral part of the Project Implementation Review (PIR). The PIR will be completed by the Chief Technical Advisor and ratings will be provided by UNEP's Task Manager. The quality of project monitoring and evaluation will also be reviewed and rated as part of the PIR. UNEP's Task Manager will have the responsibility of verifying the PIR and submitting it to the GEF. Key financial parameters will be monitored quarterly to ensure cost-effective use of financial resources.

Since this is a Medium-Size Project (MSP) of less than 4 years of duration, no Mid-Term Evaluation (MTE) will be undertaken. However, if the project is rated as being at risk or if deemed needed by the Task Manager, he/she may decide to conduct a Mid-Term Review (MTR). This review will include all parameters recommended by the GEF Evaluation Office for Terminal Evaluations (TE) and will verify information gathered through the GEF tracking tools, as relevant. The review will be carried out using a participatory approach whereby parties that may benefit or be affected by the project will be consulted. Such parties were identified during the stakeholder analysis (see section 2 above). Members of the project Steering Committee could be interviewed as part of the MTR process and the Chief Technical Advisor will develop a management response to the review recommendations along with an implementation plan. Results of the MTR will be presented to the Project Steering Committee. It is the responsibility of the UNEP Task Manager to monitor whether the agreed recommendations are being implemented.

In-line with the with UNEP Evaluation Policy and the GEF Evaluation requirements, the project will be subject to an independent Terminal Evaluation. The Evaluation Office will be responsible for the Terminal Evaluation (TE) and will liaise with the project manager throughout the process.

The TE will provide an independent assessment of project performance (in terms of relevance, effectiveness and efficiency), and determine the likelihood of impact and sustainability. The project performance will be assessed against standard evaluation criteria using a six-point rating scheme. It will have two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote learning, feedback, and knowledge sharing through results and lessons learned among UNEP staff and implementing partners. The direct costs of the evaluation will be charged against the project evaluation budget. The TE will typically be initiated after the project's operational completion. If a follow-on phase of the project is envisaged, the timing of the evaluation will be discussed with the Evaluation Office to feed into the submission of the follow-on proposal.

The draft TE report will be sent by the Evaluation Office to project stakeholders for comment. Formal comments on the report will be shared by the Evaluation Office in an open and transparent manner. The final determination of project ratings will be made by the Evaluation Office when the report is finalised.

The evaluation report will be publicly disclosed and will be followed by a recommendation compliance process. The evaluation recommendations will be entered into a Recommendations Implementation Plan template by the Evaluation Office. Formal submission of the completed Recommendations Implementation Plan by the project manager is required within one month of its delivery to the project team. The Evaluation Office will monitor compliance with this plan every six months for a total period of 12 months from the finalisation of the Recommendations Implementation Plan.

The GEF Core Indicator Worksheet is attached as Annex F. It will be updated at mid-term and at the end of the project and will be made available to the GEF Secretariat along with the project PIR report. As mentioned above, the MTR and TE will verify the information of the tracking tool.

The direct costs of reviews and evaluations will be charged against the project evaluation budget. A summary of M&E activities envisaged is provided in Annex J. The GEF contribution for this project's M&E activities (including evaluations) is USD 32,400.

10. Benefits

Describe the socioeconomic benefits to be delivered by the project at the national and local levels, as appropriate. How do these benefits translate in supporting the achievement of global environment benefits (GEF Trust Fund) or adaptation benefits (LDCF/SCCF)?

Additional socio-economic benefits comprise two components:

Health:

Currently, cheap and polluting 2&3 wheelers are contributing deteriorating air quality in urban areas in Sierra Leone. A switch towards clean electric 2&3 wheelers will improve air quality and hence reduce costs of the health sector. This is especially true against the background of the COVID-19 pandemic. Many scientists believe that better air quality and reduced number of severe courses of COVID-19 disease are correlated. Improving urban air quality would hence increase resilience against crises such as the COVID-19 pandemic.

Economy:

As outlined above, Sierra Leone is fully dependent on petroleum fuel imports. Since oil price volatility is partly buffered through adjusted fuel taxation, spikes in oil price directly affect the budget of Sierra Leone. Increased independence from oil importation through e-mobility and the use of locally generated power will increase Sierra Leone's resilience against oil price peaks and shortages in international supply. In addition, use of locally generated power will shift the transport value chain towards generation of added value at national level.

11. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF	CEO Endorsement/Approval	MTR	TE
	Low		

Measures to address identified risks and impacts

Elaborate on the types and risk classifications/ratings of any identified environmental and social risks and impacts (considering the GEF ESS Minimum Standards) and any measures undertaken as well as planned management measures to address these risks during implementation.

This is likely a low risk project. However, UNEP ESSF guiding principles -- resilience and sustainability; human rights, gender equality and women empowerment, accountability and leave no one behind-- are still applicable for low risk projects. Detailed attention should be given to potentially affected marginalized and vulnerable population in terms of project's proposed policy and strategies for them. The project will mobilize fund through partnership with financial institutions. Their terms and conditions should be poor and women-friendly.

If COVID-19 pandemic continues during the project implementation phase, attention should be given to occupational safety and health (OSH) issues of the partners, subcontractors and anyone who may participate in the training/workshops.

Project level grievance mechanism should be stated clearly in the project document and established to handle any complaints swiftly. Share UNEP's grievance mechanism with the affected population for any grievance issues that are not unresolved at the project level.

Supporting Documents

Upload available ESS supporting documents.

Title	Module	Submitted
EM Sierra Leone_ESERN_2020.12.03	CEO Endorsement ESS	

ANNEX A: PROJECT RESULTS FRAMEWORK (either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

Project Objective	Objective level Indicators	Baseline	Mid-Point Target (if applicable)	End of project Target	Means of Verification	Assumptions & Risks	UN Environment MTS reference
To mitigate GHG emissions in Sierra Leone by accelerating the introduction of electric mobility through development of legal, regulatory and institutional framework, public outreach, capacity building, demonstration pilots of electric vehicles, development of business models for private sector engagement and finance schemes for upscaling and replication.	Indicator A: Direct and Indirect Greenhouse Gas Emissions Mitigated (metric tons of CO2e) over the period 2021-2036	Baseline A: 0	Mid-point target A: N/A	End-of-project target A: Direct: 116,422 tCO2 Indirect: 271,162 tCO2	Calculation based on UNEP Emob calculator	Adoption of policies and introduction of financial mechanism by the Government of Sierra Leone Lack of interest or participation from government as well as market players/private sector stall the upscaling of the e-mobility marke in Sierra Leone.	UNEP MTS 2018-2021 Climate Change Objective: Countries increasingly transition to low-emission economic development and enhance their adaptation and resilience to climate change
	Indicator B: Number of direct beneficiaries of the project, disaggregated by gender	Baseline B: 0	Mid-point target B: Women: 30 Men: 70 Total: 100	End-of-project target B: Women: 477 Men: 738 Total: 1,215	- Attendance sheets from the child project and the Global Elecric Mobility Programme - Monitoring (the number of unique passengers erviced by the demonstration vehicles)		

Project Outcomes	Outcome level Indicators	Baseline	Mid-Point Target (if applicable)	End of project Target	Means of Verification	Assumptions & Risks	MTS Expected Accomplishment
Outcome 1: The government has established a coordinated institutional framework and endorses a gender sensitive strategy for the promotion of low-carbon electric mobility	Indicator 1.1: A national inter-sectorial coordination body to support and promote the uptake of low-carbon e-mobility in Sierra Leone is established, formalized and operational	Baseline 1.1: No	Mid-point target 1.1: The national coordination body is established and includes all key institutions. It has formulated shared goals and defined roles and responsibilities of all members.	End-of-project target 1.1: Yes - The coordination body remains operational and has agreed on post-project plan to promote e-mobility. - The national coordination body has at least 30% female members.	- Review of the body's activities (meeting summary reports) - Reports of the coordination body's querterly meetings - Gender-disaggregated member and meeting participation lists - Written agreement of cooperation - Written post-project action plan	- There is a political climate to expand ongoing national initiatives for the increase of energy efficiency in transport to e-mobility. - Members are provided with sufficient resources to participate in activities. - Willingness to cooperate.	Expected Accomplishment (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies
	Indicator 1.2: The government of Sierra Leone endorses a gender sensitive national strategy to promote low-carbon electric mobility	Baseline 1.2: No	Mid-point target 1.2: The respective Ministries are discussing the draft strategy.	End-of-project target 1.2: Yes	- Public announcements by the government and/or respective Ministries - Public availability of the strategy - The strategy contains a chapter / section on gender mainstreaming - Government gazette and other publications	- Conflicting interests making it impossible to find consensus or required compromises that render the strategy and action plan too vague. - Lack of interest by the Ministries although benefits are clear. - Lack of knowledge of the subject matter.	
	Indicator 1.3: # of reports on best practices and lessons learned on e-mobility shared by the national coordination body with the Global e-mobility project	Baseline 1.3: 0	Mid-point target 1.3: 0	End-of-project target 1.3: 1	- Lessons learned and best practices report produced by the national coordination body (deliverable 1.1.4)	- Best practices and lessons learned are generated early enough so that they can be fed into/included in the support activities by the global programme.	
Outcome 2: Technical, financial and environmental feasibility of introducing e-mobility in the country is successfully demonstrated by developing a business case for e-kekes	Indicator 2.1: # of mobility providers demonstrating interest to invest in e-kekes in Sierra Leone based on the evidence generated through the demonstration project	Baseline 2.1: 0	Mid-point target 2.1: 0	End-of-project target 2.1: At least 1 mobility provider issues a formal expression of interest	- Expression of Interest or Letter of Intent signed by a mobility provide or an investor.	- The project properly dissimenates and communicates the results of the demo project - Charging infrastructure is available - EV costs continue to decrease - EV manufacturers take interest in Sierra Leone market	Expected Accomplishment (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies
Outcome 3: The government adopts fiscal policies & regulations and endorses a financing scheme to accelerate the introduction of electric vehicles in Sierra Leone	Indicator 3.1: The policy/regulatory package (including vehicle import taxation, import regulations and registration) to incentivize the uptake of electric mobility is adopted by the government	Baseline 3.1: No	Mid-point target 3.1: No	End-of-project target 3.1: Yes	- Government gazette and other publications - Policy package document	- Favorable political climate to the introduction of electric public transport modes - Relevant Ministries (i.e Ministry of Industry and Trade, Ministry of Finance, etc.) are properly involved in the project	Expected Accomplishment (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies
	Indicator 3.2: The financing scheme (including a procurement guideline and business models) for the procurement of electric vehicles is endorsed by the government	Baseline 3.2: No	Mid-point target 3.2: No	End-of-project target 3.2: Yes	- Business / financing model - Procurement guideline document - LOIs - Government gazette and other publications	- Viable business models for electric public transport modes are identified and a corresponding finance scheme being developed	
Outcome 4: Measures are developed to ensure long-term environmental sustainability of electric mobility in Sierra Leone	Indicator 4.1: The scheme for re-use, recycling and sound disposal of used electric vehicle batteries is endorsed by the Ministry of Environment	Baseline 4.1: No	Mid-point target 4.1: N/A	End-of-project target 4.1: Yes	- Government gazette and other publications - Scheme for re-use, recycling and sound disposal of used batteries document	- Interest by e-waste collection companies to collect and treat of used EV batteries - Sufficient capacity in the waste management sector to enable the re-use of used batteries	Expected Accomplishment (b): Countries increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

Please refer to the separate pdf files uploaded in the "Documents" section of the GEF Portal which include all responses to the GEF's reviews:

Annex B.1 – Responses to GEF Sec reviews (on the PFD)

Annex B.2 – Responses to GEF Sec reviews (on the PFD addendum)

Annex B.3 – Responses to STAP comments

Annex B.4 – Responses to Council comments

UNEP replies to STAP screening:

Part I: Project Information	
GEF ID	10114
Project Title	Global Program to Assist Countries with Shift to Electric Mobility
Date of Screening	27-May-19
STAP member Screener	Saleem H. Ali
STAP secretariat screener	Sunday Leonard
STAP Overall Assessment	Concur

STAP comments	UNEP replies
The e-mobility program has been developed based on a set of 17 child projects, as well as synergies with the EC Solutions Plus program. Partnership with the International Energy Agency gives the proposal a high level of rigor in terms of metrics of energy costing and efficiency measurement criteria. The proposal is also supported by relevant studies from applicable development agencies. The public private partnership aspect of the pr	

The public-private partnership aspect of the project is convincing and likely to deliver the over all desired impact - if well- implemented.

Comment 1: Key barriers to the scaling of e-mobility have been recognized in the child projects. However, there are also some system factors around e-mobility that deserve attention, and which should be highlighted as barriers to upscaling. The material needs of e-mobility infrastructure in terms of the availability of battery storage technology, and the link between the price of key metal components needs to be specified more clearly. The project has set up a “batteries working group” to assure a reliable supply of batteries through recycling and criticality assessments, but how such a working group would ensure supply is not clearly articulated. The proposal notes a connection with the Global Battery Alliance of the World Economic Forum which will help to avoid redundancies and build a wide private sector alliance. The project proponents should also monitor the Roland Berger “E-Mobility” Index in terms of key lessons from countries that have achieved high rankings in this index. The Australian government has also set up a new Cooperative Research Centre on Batteries which could be an important resource.

Comment 2: Clearly the E-mobility program has positive interactions with the Sustainable Cities Impact Program because much of the high-density implementation and climate benefits of e-

Reply 1: The project recognizes the issues around provision of raw materials for battery production. Nonetheless, it is not the focus of the project to ensure availability of these materials and subsequent battery supply. It seems to be understood that availability of resources such as lithium, cobalt, nickel and copper and their transformation into reserves (classification based on IEA Global Electric Vehicle Outlook [GEVO] 2019) is not constrained by the natural resource base but rather by the pace of investment to un-tap these resources (see IEA GEVO 2019). The project seeks for acceleration of EV demand, and therefore acceleration of demand for batteries. It is believed that such an accelerated demand will lead to the necessary investment in battery production capacity and hence the provision of raw materials.

Nonetheless, the project will put focus on the development of regulation and schemes for collection of used EV batteries for re-use, recycling and safe disposal, mainly through the International Energy Agency (IEA) led Global Thematic Working Group on “Charging infrastructure, grid integration, low-carbon power supply and batteries”. The project aims at facilitating re-use and recycling of used EV batteries through “design for recyclability” of EV batteries to ensure that a trajectory leading to some sort of circular economy can be taken in the future. Development of adequate policies will play a major role in the stipulation of high recycling rates to ease pressure on raw material demand and to increase sustainability of e-mobility as a whole. This also includes the development of guidelines and agreements with regards to the social and environmental standards for the sourcing of these materials. Private sector alliances such as the mentioned Global Battery Alliance of the World Economic Forum can help with the facilitation of such agreements and will be included in the design of the relevant operational parts of the Global Child Project. Similarly, literature and indices such as the mentioned Roland Berger “E-Mobility” Index will be included to the extent possible within the work of the relevant Working Groups. It needs to be noted that the Basel and Stockholm Convention Regional Centre for the Asia and Pacific Region in China (BCRC-SCRC China, hosted by the School of Environment of Tsinghua University) will be part of the GEF Global E-Mobility Programme. The Basel Convention regulates the international trade of waste, which might play a key role in the area of used EV battery recycling since large scale battery recycling is likely to depend on international shipping of used EV batteries and / or battery components.

Reply 2: For countries that have both an e-mobility and a Sustainable Cities project (i.e. India, etc.), close coordination will be undertaken during project implementation to ensure synergies. Whenever the sustainable cities projects organize events/workshops on urban mobility, the e-mobility project team / proponents will be invited to participate.

mobility would be realized in an urban context. There needs to be good coordination between t he two programs.	
Comment 3: A core challenge will be to ensure t hat the source of electricity for the e-mobility pl atform is low carbon to maximize the GHG redu ction benefit. All calculations for GHG emission s (cars, buses versus trains etc.) need to be eva luated in terms of life-cycle analysis methodolo gies to ensure full systems-wide GHG benefits and ensure that impacts are internalized.	Reply 3: GHG emission saving potentials for all Country Child Projects are evaluated based on 1.) the curre nt local carbon footprint of grid electricity; and 2.) prospects to reduce the average carbon footprint of grid electricity based on commitments and pledges to mitigate climate change. Many of the low and middle-in come countries included in the Global E-Mobility Programme already have power mixes based on high sha res of low carbon electricity such as hydro, wind, solar PV and nuclear power. This is true for many of the Country Child Projects in Latin America, Africa, Eastern Europe and West Asia. For Country Child Projects with relatively high grid emission factors such as India, most of the SIDS, Indonesia, South Africa, etc. proj ects have been designed in a way to ensure that sufficient amount of low carbon power will be integrated i n the electricity mix used to power the demonstration vehicles to yield net climate benefits. As a general “r ule of thumb” a carbon footprint threshold for grid electricity of around 800 to 900 gCO2/kWh is assumed to mark the line above which additional measures are necessary to reach net reductions of greenhouse ga s emissions. Compared to alternative, technology based transport GHG mitigation measures such as the l arge scale use of biofuels as well as the use of potentially low carbon fuels such as hydrogen and syntheti c fuels, it is believed that the direct use of electricity constitutes the most efficient means of decarbonizin g transportation, alongside implementation of “avoid” (avoid transport demand) and “shift” measures (shif t transport demand to more efficient means of mass transport as well as non-motorized transport). It is th erefore necessary to introduce e-mobility now, in order to be prepared for upscaling once mitigation target s in the relatively low-abatement cost power sector have been achieved.

STAP comments	UNEP replies
Comment 4: The program will generate both cl imate mitigation and air pollution reduction be nefits. If possible, the expected health benefits from air pollution reduction (for example, pre mature death prevention and Disability-Adjust ed Life Years - DALYs) should be estimated du ring project development. This will provide a m ore detailed information on the environmental and socio-economic benefits from the GEF’s i	Reply 4: The air pollution reduction and associated expected health benefits will not be measured/quantifi ed by the projects through GEF funding. However, if the countries wish to undertake these estimates, they will be welcome to do it through co-finance contributions.

and socio-economic benefits from the GEF-8 investment.	
Comment 5: There is detailed evidence of multi-stakeholder engagement, particularly for training programs, and other activities which connect with the OECD's multi-stakeholder engagement processes. It would be helpful to acknowledge that e-mobility has implications for "energy justice", because growth of this sector has largely been in high-income markets, especially for electric cars.	Reply 5: E-mobility has the potential to increase energy justice and to support the development of local value chains. While petroleum-based fuels are imported in most of the Country Child Projects, electricity is generated locally, with the potential to include high shares of locally generated renewable power. Introduction and up-scaling of e-mobility has therefore the potential to increase energy security and to hedge against the price volatility of the global petroleum fuel market. In many of the Country Child Projects, consumer prices of petroleum fuels are regulated by government and price spikes in the global supply chain has immediate effects on countries budgets. Total cost of ownership of electric vehicles, in particular when used in fleets such as public transportation fleets (buses, taxis, 2&3 wheeler taxis) are already lower than for conventional vehicles today in many of the Child Country Projects. The large-scale introduction of EVs in such fleets can therefore lead to better economics of public transport services, which in turn can lead to better service and lower cost of transportation for the end consumer. In addition, the provision of e-mobility applications such as electric 2&3 wheelers in least developed countries can un-tap synergies with rural electrification based on renewable micro and mini-grids (e,g, based on solar PV & electricity storage). Last but not least, the relatively less complex nature of electric vehicles can lead to the creation of green jobs in the local assembly and manufacturing of EVs, notably electric 2&3wheelers.
Comment 6: STAP recommends that project proponents review the following study: Sovacool, B. K., Kester, J., Noel, L. & de Rubens, G. Z. Energy Injustice and Nordic Electric Mobility: Inequality, Elitism, and Externalities in the Electrification of Vehicle-to-Grid (V2G) Transport. Ecological Economics 157, 205–217 (2019).	Reply 6: We take note of this recommendation. This will be shared with project proponents and the global thematic working groups.
Comment 7: E-vehicle technology is rapidly evolving: it will be important therefore to keep track of and incorporate innovations in the field. University partners in academia would be recommended in this regard. A few key academic partners are noted such as University of California Davis and Technical University of Denmark. These institutions and othe	Reply 7: The GEF Global E-Mobility Programme will be implemented in close collaboration with the European Commission funded Solutions Plus project. The Solutions Plus project, which started implementation in January 2020, and which has a total budget of about 18 million EUR, is targeting e-mobility demonstration projects in 9 low and middle-income cities world-wide, and includes replication activities of these demonstration projects in a number of additional cities and countries. UNEP is responsible for the developme

rs should be involved in the M&E program. Comment 8: A recent study which may be helpful in considering some of the pitfalls of e-mobility is also referenced below: Onat, N. C., Kucukvar, M., Aboushaqrah, N. N. M. & Jabbar, R. How sustainable is electric mobility? A comprehensive sustainability assessment approach for the case of Qatar. Applied Energy 250, 461–477 (2019).	demonstration projects in a number of additional cities and countries. UNEP is responsible for the development of replication projects in 8 cities worldwide. It has been agreed that EC Solution Plus funds will be included in 5 GEF Country Child Projects (around 60k to 80k USD per replication project) to procure charging equipment and to provide targeted support to local innovators with the installation and operation of this equipment. Similar to UNEP, DTU is a consortium member of the EC Solution Plus project and is mainly responsible for impact assessment and data collection and analysis of the project. UNEP will make sure that impact assessment and data collection and analysis will be closely coordinated between the GEF E-mobility Programme and the EC Solution Plus project and that all tools and materials as well as project outcomes and lessons learnt will be shared between both projects. In fact, the GEF and the EC Solutions Plus project target the joint and complementary development of tools, training materials, and events. Academic partners may also include the University of California, Davis, which is a long-standing partner in UNEP's Global Fuel Economy Initiative (GFEI) through the Sustainable Transportation Energy Pathways Program directed by Lew Fulton. Reply 8: We take note of this recommendation. This will be shared with project proponents and the global thematic working groups.

Part I: Project Information	What STAP looks for	Response	UNEP replies
B. Indicative Project Description Summary			
Project Objective	Is the objective clearly defined, and consistently related to the problem diagnosis?	Yes – the program has a very clearly defined objective of electric mobility.	-
Project components	A brief description of the planned activities. Do these support the project's objectives?	Yes, the outcomes support the objectives.	-
Outcomes	A description of the expected short-term and medium- term effects of an intervention.	These are defined in detail and referenced through a theory of change. Global environmental benefits of carbon mitigation are noted with key as	-

		sumptions about the source of ener gy.	
	Do the planned outcomes encompas s important global environmental ben efits/adaptation benefits?		
	Are the global environmental be nefits/adaptation benefits likely to be generated?		
Outputs	A description of the products and servi ces which are expected to result from t he project. Is the sum of the outputs lik ely to contribute to the outcomes?	Yes, there is a clear linkage between outputs an d outcomes made through the theory of chang e materials provided.	-
Part II: Project justification	A simple narrative explaining the projec t's logic, i.e. a theory of change.		
1. Project description. Brie fly describe:			
1) the global environmental and/or adaptation problem s, root causes and barriers that need to be addressed (systems description)	Is the problem statement well-defined?	Yes – detailed review of the material fr om the perspective of development ag encies provided. However, academic li terature review is not provided.	-
	Are the barriers and threats w ell described, and substantiat ed by data and references?		
	For multiple focal area projects: does the problem statement and analysis i dentify the drivers of environmental d egradation which need to be address ed through multiple focal areas; and i s the objective well-defined, and can i t only be supported by integrating tw o, or more focal areas objectives or p rograms?		
2) the baseline scenario	Is the baseline identified clearly?	Yes, baseline of current programs for countries	-

or any associated basel ine projects		provided as well as the relationship with EC Sol utions plus program.	
	Does it provide a feasible basis for qua ntifying the project's benefits?		
	Is the baseline sufficiently robust to s upport the incremental (additional co st) reasoning for the project?		
	For multiple focal area projects:		
	are the multiple baseline analyses presented (supported by data and r eferences), and the multiple benefit s specified, including the proposed indicators;		
	are the lessons learned from similar o r related past GEF and non-GEF interv entions described; and how did these lessons inform the design of this proj ect?		
3) the proposed alternative scenario with a brief descri ption of expected outcome s and components of the pr oject	What is the theory of change?	Good presentation of theory of change material in Figure 6.	
	What is the sequence of events (requir ed or expected) that will lead to the des ired outcomes?		
	· What is the set of linked acti vities, outputs,and outcomes to ad dress the project's objectives?		
	· Are the mechanisms of chan ge plausible, and is there a well-inf ormed identification of theunderlyi ng assumptions?		
	· Is there a recognition of what a		

	daptations may be required during pr oject implementation to respond to c hanging conditions in pursuit of the t argeted outcomes?		
5) incremental/additional co st reasoning and expected c ontributions from the baseli ne, the GEF trust fund, LDCF, SCCF, and co-financing	GEF trust fund: will the proposed incr emental activities lead to the delivery of global environmental benefits?	Yes – very detailed cost reasoning and partner ships provided.	-
	LDCF/SCCF: will the proposed incre mental activities lead to adaptation which reduces vulnerability, builds a daptive capacity, and increases resil ience to climate change?		
6) global environment al benefits (GEF trust f und) and/or adaptatio n benefits (LDCF/SCC F)	Are the benefits truly global enviro nmental benefits, and are they me asurable?	Yes – electric mobility if implemented with low carbon energy source has clear global environ mental benefits.	-
	Is the scale of projected benefits both plausible and compelling in relation to t he proposed investment?		
	Are the global environmental benefits e xplicitly defined?		
	Are indicators, or methodologies, provided to demonstrate how the global environmental benefits will be measured and monitored durin g project implementation?		
	What activities will be implemented to i ncrease the project's resilience to clima te change?		
7) innovative, sustainability an d potential for scaling-up	Is the project innovative, for exa mple, in its design, method of fin ancing, technology, business mo del, policy, monitoring and evalua	The PFD has a short section on innovation (S ection 7 on page 68) which largely focuses on the inherent innovation of e- mobility infrastru cture as a new technology. Perhaps the most	-

	tion, or learning?	significant innovations in the GEF program its elf would be the financing arrangements that are being proposed through a variety of public -private partnerships that are being proposed, building on the vast experience of the Internat ional Energy Agency. Regarding' STAP's guidel ines on innovation in projects, the wide range of examples provided of innovative start-ups t hat emanate from the EC's Solutions Plus pro gram are also appropriate. These should be fu rther analysed to ascertain the level of actual success they are having (refer to section start ing on page 36 and the table which starts on page 37).	
	Is there a clearly-articulated vision of how the innovation will be scale d-up, for example, over time, acros s geographies, among institutional actors?		
	Will incremental adaptation be req uired, or more fundamental transfo rmational change to achieve long t erm sustainability?		
1b. Project Map and Coordinat es. Please provide geo- refere nced information and map wh ere the project interventions wi ll take place.			
2. Stakeholders. Select the sta keholders that have participate d in consultations during the p roject identification phase: Indi genous people and local com munities; Civil society organiza tions; Private sector entities.If none of the above, please expl ain why. In addition, provide in	Have all the key relevant stakehold ers been identified to cover the co mplexity of the problem, and proje ct implementation barriers?	The energy justice aspect of this program sho uld be closely monitored as e-mobility uptake continues to favor higher income households	Please refer to our response to the en ergy justice comment in the 1st sectio n above (reply 5).

dicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.			
	What are the stakeholders' roles, and how will their combined roles contribute to robust project design, to achieving global environmental outcomes, and to lessons learned and knowledge?		
3. Gender Equality and Women's Empowerment. Please briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis). Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes/no/ tbd. If possible, indicate in which results area(s) the project is expected to contribute to gender equality: access to and control over resources; participation and decision-making; and/or economic benefits or services. Will the project's results framework or logical framework include gender- sensitive indicators? yes/no /tbd	Have gender differentiated risks and opportunities been identified, and were preliminary response measures described that would address these differences?	Gender sensitivity analysis and action plans built into program. The uptake of electric motor cycles disproportionately by men for cultural reasons is noted as a useful example.	All country child projects as well as the global child project include a gender analysis and a gender action plan (in PART II section 3. Gender Equality and Women's Empowerment of the CEO Endorsement Document) to mainstream gender during project implementation.
	Do gender considerations hinder f		

	ull participation of an important st akeholder group (or groups)? If so, how will these obstacles be addre ssed?		
5. Risks. Indicate risks, includi ng climate change, potential s ocial and environmental risks t hat might prevent the project o bjectives from being achieved, and, if possible, propose meas ures that address these risks t o be further developed during t he project design	Are the identified risks valid and co mprehensive? Are the risks specifi cally for things outside the projec t's control?	A wide variety of risks have been identified sp ecially with reference to critical supply chains.	-
	Are there social and environmental risks which could affect the projec t?		
	For climate risk, and climate resilie nce measures:		
	· How will the project's objec tives or outputs be affected by cli mate risks over the period 2020 to 2050, and have the impact of thes e risks been addressed adequatel y?		
	· Has the sensitivity to clima te change, and its impacts, been a ssessed?		
	· Have resilience practices a nd measures to address projected climate risks and impacts been co nsidered? How will these be dealt with?		
	· What technical and instituti onal capacity, and information, will be needed to address climate risks		

	be needed to address climate risks and resilience enhancement measures?		
6. Coordination. Outline the coordination with other relevant GEF-financed and other related initiatives	Are the project proponents tapping into relevant knowledge and learning generated by other projects, including GEF projects?	Figure 9 presents a good organizational framework for coordinating the project across multiple agencies and private partners.	-
	Is there adequate recognition of previous projects and the learning derived from them?		
	Have specific lessons learned from previous projects been cited?		
	How have these lessons informed the project's formulation?		
	Is there an adequate mechanism to feed the lessons learned from earlier projects into this project, and to share lessons learned from it into future projects?		
8. Knowledge management. Outline the "Knowledge Management Approach" for the project, and how it will contribute to the project's overall impact, including plans to learn from relevant projects, initiatives and evaluations.	What overall approach will be taken, and what knowledge management indicators and metrics will be used?	University partnerships could be better leveraged for knowledge management. Clearer role delineation of university and research partners would be a positive development.	Please refer to our response in relation to UCD and DTU in the 1st section above (reply 7).
	What plans are proposed for sharing, disseminating and scaling-up results, lessons and experience?		
STAP advisory response	Brief explanation of advisory response and action		

	proposed		
1. Concur	STAP acknowledges that on scientific or technical grounds the concept has merit. The proponent is invited to approach STAP for advice at any time during the development of the project brief prior to submission for CEO endorsement.		
	* In cases where the STAP acknowledges the project has merit on scientific and technical grounds, the STAP will recognize this in the screen by stating that “STAP is satisfied with the scientific and technical quality of the proposal and encourages the proponent to develop it with same rigor. At any time during the development of the project, the proponent is invited to approach STAP to consult on the design.”		
2. Minor issues to be considered during project design	STAP has identified specific scientific /technical suggestions or opportunities that should be discussed with the project proponent as early as possible during development of the project brief. The proponent may wish to:		
	(i) Open a dialogue with STAP regarding the technical and/or scientific issues raised;		
	(ii) Set a review point at an early stage during project development, and possibly agreeing to terms of reference for an independent expert to be appointed to conduct this review.		

	The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.		
3. Major issues to be considered during project design	STAP proposes significant improvements or has concerns on the grounds of specified major scientific/technical methodological issues, barriers, or omissions in the project concept. If STAP provides this advisory response, a full explanation would also be provided. The proponent is strongly encouraged to:		
	(i) Open a dialogue with STAP regarding the technical and/or scientific issues raised; (ii) Set a review point at an early stage during project development including an independent expert as required. The proponent should provide a report of the action agreed and taken, at the time of submission of the full project brief for CEO endorsement.		

UNEP responses to GEF Council comments on the
Global Programme to Support Countries with the Shift to Electric Mobility (GEFID 10114)

v Comment by Yoshiko Motoyama, GEF Alternate Council Member, Japan, Deputy Director Global Environment Division, International Cooperation Bureau, Ministry of Foreign Affairs of Japan, Council, Japan made on 6/1/2020

The below comments from Japan were provided prior to the Council meeting. An initial agency response was provided and can be found in the list of documents specific to the project in the GEF Portal.

On single-country projects, especially with large stated co-finance ratios, and cyclical-industry-related projects, such as Project 10564 (Environmentally Sustainable Development of the Iron and Steel Industry) and Project 10544 (electric mobility addendum):

· We anticipate that participants of these projects may be severely impacted by the COVID-19 crisis. How realistic are the published co-financing arrangements to be met, and for the industry to meet the higher operating costs - - without de facto subsidization from the GEF?

Response:
The current health crisis related to COVI-19 poses some difficult challenges for the automotive sector, but also, looking more specifically at the electric vehicles segment, it offers some opportunities.

Challenges include delays related to the finalization of the design of some of the national child projects, due for instance to international travel restrictions for the specialists involved in the design and the relative consultations. Broader challenges also include depression of demand for cars, at least in the short term, and potential shift in government priorities to focus limited national budget and workforce to more pressing health-crisis related issues. At this point it is difficult to make assumptions regarding the extent to which this will affect government priorities with regards to the allocation of budget and work force. What can be said is that there is a clear case to be made for mobility to as a key pillar for sustainable and clean transportation investments in the context of economic recovery plans.

Opportunities: According to today's knowledge, there seems to be a correlation between air quality and COVID-19, whereby COVID-19 incidence and mortality are significantly higher in areas that have high levels of local air pollution. This includes particulate matters (e.g. PM2.5, PM10)[1] as well as N_2O from both mobile (e.g. trucks and cars) and stationary (e.g. coal power stations) emission sources[2]. Since electric mobility has the potential to significantly contribute to improved urban air quality, we assume that it will play an important role in countries' strategies to respond to the COVID-19 pandemic.

Similarly, a shift to electric mobility will significantly reduce the dependency of countries to import petroleum petrol fuels. It therefore increases resilience against restrictions or price spikes resulting from international crisis.
While during COVID-19 vehicles sales have plummeted by half or more, electric vehicles sales have been relatively less affected. Analysts from Bloomberg New Energy Finance have estimated that the electric segment of car sales will continue to outperform in terms of growth the traditional cars one as we move past the crisis, even though oil prices at a historic low will create some negative headwinds. However, orders of buses are likely to suffer delays if public perception of mass transit as unsafe does persist.

Furthermore, in terms of green recovery, clean mobility is expected to play a key role in getting the global economy back on track. Continued social distancing measures will have an impact on how we use transportation services, and in particular public transportation, but certain modes of public transport are expected to grow, in particular in low and middle-income countries. These modes include 2&3 wheeler taxis, or usual taxis and ride-hailing providers using passenger cars, to reduce close contact with higher numbers of riders. For many of these modes good electric alternatives are available.

Based on current trends and signals it is expected that after COVID-19 the shift to electric mobility would continue, if not increase. Many city governments around the world are looking at opportunities to take advantage of the significant reduction in urban congestion linked to the COVID-19 mobility restrictions to introduce permanent limitations to the use of private vehicles, especially if internal combustion engines. Such measures will not only reduce local air pollutants (such as particulates PM2.5 and PM10, but also N_2O) and carbon emissions but can also increase resilience of transport systems against the current - and any potential future - health crises. The contribution of low-carbon mobility, including electric mobility, to a more resilient economy will be further integrated in the Programme and highlighted throughout the training components to be delivered to participating countries.

· What happens to the funds/projects if some participants cease to become going concerns (=i.e. bankruptcy)?

Response:
The information presented in the project documentation (PIFs and PFDs) represents the best available information available at the time of the submission to Council, following the technical review from the GEFSEC. Some level of change in the project design and in the availability of the amount of co-financing estimated ex-ante is possible and sometimes even desirable, considering the additional in depth design analysis conducted during the project preparation phase, including through the PPG-funded activities, between the submission of PIFs/PFDs and the submission of the relative CEO ER. Co-financing arrangements and amounts specified in PIFs/PFDs are best-case estimations that GEF Implementing Agencies and National Executing entities or participating actors provide for the formulation of the project proposals. These up-front estimates are assessed as part of the GEFSEC review process in terms of their relevance and adequacy vis-à-vis the scope and objective of the proposed Project/Program activities.

Once the PIF/PFD is approved by Council, as part of the detailed design process, Agencies and actors listed as other providers of co-financing amounts are asked to reassess and formally confirm that the co-financing volumes which had been included in the PIF/PFD have been approved by the competent authority within each specific organization. This is formalized through the submission of co-financing confirmation letters. In case a specific entity is no longer able to provide the previously stated co-financing amount, either in full or in part, generally Implementing Agency and GEFSEC would work together to assess if the stated co-financing is essential to achieve the project/program's objective. If so, GEFSEC and Agency assess if the expected amount of co-financing that is no longer available can be replaced by existing or additional co-financing from other actors. In case the co-financing is deemed essential, and there is no possibility to source such funds that are considered necessary to achieve the stated objectives, GEFSEC and Agency would consider whether to revise the approved project/program, and if not possible/advisable the project/program would not receive CEO Endorsement.

Given that the development phase will take around 12 months, and that the COVID crisis might trigger some government support to accelerate the further uptake of electric vehicles, as we have seen in France, for example (see quote below) , we hope that the co-finance might not be such an issue in a year from now, when the CEO endorsement documents will be due for submission. In any case, if planned investments and/or co-finance becomes an issue, agencies will work with the project developers to identify other sources of co-finance that can substitute the initial set of co-financiers, while keeping the project scope. If this is not possible, the developers will try to re-adjust the scope to respond to available co-finance that is still aligned with the project objectives. If this fails as well, then the developers might wish to either postpone the project or discuss with the country if the project should/can go ahead.

· We raised at the last council our interest in verifying the ability of GEF and its accredited agencies to conduct independent audits of such contributions, including verifying and assessing the abilities of the involved parties to meet the co-financing obligations of this project. We recognize that this process --- along with many other due diligence procedures --- could be increasingly impaired by the latest COVID-19 crisis. Detailed explanations on how the Secretariat

plans to handle these types of issues would be appreciated (preferably in writing to be posted on the GEF website, as it is not clear from the existing material and guidelines on the website)

Response:
In addition to the explanation provided above on the dynamics of co-financing, co-financing is reported on a yearly basis, based on progresses related to the sourcing and use of co-financing amounts. In the case of the e-mobility Programme, the Lead Implementing Agency is UNEP. For each project implemented by UNEP, the Project Manager has responsibility to seek signed co-finance reports from each co-financier of that given project. While the co-financiers are not audited, their signed (by the authorized authority in each entity providing co-financing) co-finance reports are available for the mid-term and terminal evaluators, so that the evaluation process can assess if that given GEF project reached or not the co-finance amounts which had been estimated up-front.

· We would also like to stress the need for transparency and balanced involvement of private sector providers in any of these corporate projects (particularly highly cyclical sector projects such as the ones included in this work program in the steel and automobiles sectors), especially amid the COVID crisis, given that all such industry participants indiscriminately face severe business conditions. Projects should be carefully constructed and communicated, so that they are not deemed to infringe upon rules against subsidization of particular entities, thereby "reinforcing the market power of some targeted companies at the expense of other firms" (as per the rules). For example, "to de-risk investments in …." in the project description/ objectives implies the potential of subsidization, highlighting the need for transparency in their construct and execution, so that they are visibly in line with GEF rules and regulations and the Private Sector Engagement Strategy to be adopted at this Council session. This type of crystal-clear communication/ governance insurance measure is essential for the GEF to credibly raise funding for private sector-driven projects in a tough financial environment.

Response:
We certainly acknowledge the importance of the point being raised here: all projects must be careful to run clear, fair and transparent procurement policies, which Agencies have in place for GEF projects. The recently adopted MINIMUM FIDUCIARY STANDARDS FOR GEF PARTNER AGENCIES Policy (GA/PL/02, of Dec 19, 2019), which covers both the Agency's internal procurement policies and procurement by recipients of funds, provides that:
Specific GEF Partner Agency policies and guidelines promote economy, efficiency, transparency and fairness in procurement through written standards and procedures that specify procurement requirements, accountability, and authority to take procurement actions. As a minimum, these policies and guidelines provide for:

- *Open competition and define the situations in which other less competitive methods can be used; and*
- *Wide participation through publication of business opportunities; descriptive bid/ proposal documents that disclose the evaluation criteria to be used; neutral and broad specifications; non-discriminatory participation and selection principles; and sufficient time to submit bids or proposals.*

UNEP is the GEF agency leading the global e-mobility programme and will take on this guidance in the development of the global project and its own child projects and will also pass it along to all other Implementing Agencies (UNDP, UNIDO, DBSA and EBRD). Of course, the participation of private sector partners and entities is key for the e-mobility programme and UNEP and the other Implementation Agencies will continue to seek their support and participation in the program. The Program objective is to promote a shift towards electric mobility and away from Internal Combustion Engines, and as such all projects will be working with private sector partners that are actively working in this space.

In this context, it may also be useful to refer to the GEF-7 Programming Directions, para 121, as they refer to the Climate Change Focal Area:

121. To take advantage of the GEF's comparative advantage, programming under this objective does not prioritize direct support for large-scale deployment and diffusion of mitigation options with GEF financing only. Rather, GEF-7 resources should be utilized to reduce risks and enhance enabling environments in order to facilitate additional investments and support by other international financing institutions, the private sector, and/or domestic sources to replicate and scale up in a timely manner.

The global e-mobility program is responding to the GEF's grant role to support innovation and technology transfer at key early and middle stages of development, focusing on the demonstration and early deployment of innovative technologies to deliver sustainable energy solutions that control, reduce, or prevent GHG emissions.

v Comment by Kordula Mehlhart, GEF Council Member, Head of Division on Climate Finance, BMZ, Council, Germany made on 6/18/2020

Germany approves the following PIFs in the work program but asks that the following comments are taken into account:

Germany approves the addendum to the global programme that contributes to the adoption of e-mobility by strengthening the technical and financial capacities of countries and taking into account different local prerequisites and requirements.

Suggestions for improvements to be made during the drafting of the final project proposal:

· The introduction of e-busses to local public transportation fleets differs from other e-mobility forms, e.g. from heavy duty long-distance trucks, when it comes to technical aspects, charging infrastructure and the role of public / private investments. Given the unique involvement of public stakeholders in the purchase and operation of e-busses as well as the significant effect e-busses can have in terms of GHG-emission reductions in urban centres, this subject deserves a great amount of attention. Germany therefore proposes, that the significance of the acceleration of ebus adoption be reflected in the program structure, by creating an additional working group focused on e-busses in public transportation.

Response:
Many countries have prioritized the introduction of electric busses in their country projects. Often as part of their efforts to introduce mass transit/ bus rapid transit systems. There will be a key interest in developing tools about the introduction of e-busses in developing country operating environments. There are also many lessons learned and examples (good and bad) in all regions that need sharing (for example the Chile and South Africa pilots). On the other hand, no country projects have prioritized electric trucks in their projects. Generally, this sector is seen as the last sector to switch, after busses, 2&3 wheelers and light duty vehicles (with the exception of the smaller delivery trucks like vans and so). Therefore, our thinking is to focus the HDV working group on busses. With possibly (probably) a smaller sub-group focusing on electric trucks. So rather than having a busses sub-group, we want to focus the HDV working group on busses and have a sub-group on trucks.

· Germany welcomes that information exchange and knowledge management are a substantial part of the programme. We suggest establishing a close working relationship to the new TUMI (Transformative Urban Mobility Initiative) E-Bus mission. The"TUMI E-Bus Mission" follows a similar logic and approach in supporting cities in the uptake of e-busses. As the e-bus implementation in public transport is largely dependent on an involvement of city level

decisionmakers, the TUMI E-Bus Mission can contribute to the proposed programme by feeding in local perspectives and requirements.

Response:
UNEP already has existing working relations with the Transformative Urban Mobility Initiative. Coordination with and involvement of the TUMI initiative in the global e-mobility programme will be added to the project document (especially through the activities implemented as part of the Regional Support and Investment Platforms).

v Comment by Anar Mamdani, Director, Environment Division (MSS), Global Issues and Development Branch (MFM), Global Affairs Canada, Council, Canada made on 6/26/2020

· We recommend that there be some consideration to mitigating the environmental impacts of electric vehicles, particularly where facilities for managing batteries don't exist.

Response:
Component 1 of the global e-mobility project includes a Global Thematic Working Group on "Electric vehicle charging, grid integration, renewable power supply and battery re-use, recycling and safe disposal". This Working Group's main objective will be to develop and make available knowledge materials that support governments in their ambitions for advancing a sustainable roll out of electric mobility, including policy instruments to ensure the sustainability of the battery supply chain and the end-of-life treatment of batteries. It also aims at the facilitation of discussions between regulators, recyclers and battery / vehicle manufacturers to better understand and enhance battery design to improve recyclability of batteries, especially with regards to economic viability.

In addition, Component 4 of the country child projects is usually focused on the long-term environmental sustainability of low-carbon electric mobility, which include outputs/activities to ensure/promote the environmentally sound management of used batteries (i.e. collection, re-use, recycling and disposal).

v Comment by Elizabeth Nichols, U.S. Department of State | Bureau of Oceans, International Environmental and Scientific Affairs (OES), Office of Environmental Equality and Transboundary Issues (EQT), Council, United States made on 7/2/2020

· Within Bangladesh, we recommend additionally coordinating with the State Minister for Power, Energy, and Mineral Resources, and the Dhaka North City Corporation Mayor.

Response:
Comment taken and shared with UNDP project proponents in charge of the Bangladesh child project. This recommendation will be considered during the proposal development phase of the Bangladesh e-mobility project.

· Within Sri Lanka, there was very minimal reference to the project's stakeholders. We look forward to seeing much more clearly defined information on stakeholders and their engagement in the next stage of proposal development.

Response:

Comment taken and shared with UNEP project proponents in charge of the Sri Lanka child project. Engagement of project stakeholders will be further elaborated during the proposal development phase of the Sri Lanka e-mobility project.

v Comment by Dr Katharina Stepping, Deputy Head of Unit Climate Finance, Federal Ministry for Economic Cooperation and Development (BMZ), Council, Germany made on 6/28/2019

Germany welcomes the proposal aiming to support countries to design and implement electric mobility programs as part of an overall shift to sustainable, low carbon transport sector. Germany welcomes the proposal as the first global inter-agency electric mobility programme and appreciates that the project clearly aims at supporting the rapid introduction of electric mobility in GEF recipient countries, herby making a contribution to the low carbon transition in the transport sector. At the same time, Germany has the following comments that it suggests be addressed in the next phase of finalizing the project proposal:

Suggestions for improvements to be made during the drafting of the final project proposal:

· Germany welcomes that the project foresees a clear role for the private sector as a supplier for electro mobility technologies. However, given that private sector investments in electric mobility will be key, Germany would welcome the inclusion of activities that specifically directed at spurring private investments in electric mobility (from the demand side). For instance, some firms have switched parts of their operations to electric fleets. These types of opportunities could be considered within the PIF.

Response:

Almost all of the Country Child Projects are geared towards the introduction of electric 2&3 wheelers (and sometimes e-passenger cars) as well as e-buses into private or government owned public transportation fleets through: 1) Awareness raising, capacity building and institutionalization of e-mobility; 2) Short term barrier removal through demonstration of e-mobility; 3.) Scale-up and replication through development of e-mobility policies, business models and financial mechanisms; and 4.) Support of environmental sustainability through battery re-use / end-of-life considerations and integration of renewable power for vehicle charging. The Country Child Projects therefore target to spur e-mobility demand in the project countries.

The Regional Support and Investment Platforms under the Global Programme will create market-place events whereby the current as well as potential new projects meet with financiers (development banks, venture capital, green funds) and e-mobility manufacturers. The idea is to bundle demand for EVs and EV supply equipment and to raise interest from manufacturers in regions of the world, which are not yet in the focus of manufacturers, but have a great market potential.

The Global Working Groups and the Regional Supply and Investment Platforms are a means of private sector participation, and invites all major EV and EV supply equipment manufacturers to participate in events, tasks groups, etc. This also includes bringing together multinational EV and EVSE manufacturers with the vibrant mobility service provider start-up scene in low and middle-income countries.

Many Country Child Project also include work streams to incentivize the local assembly and manufacturing of e-vehicles, such as e-motorcycles and e-3wheelers.

· Germany welcomes the comprehensive and overall well-structured project design. To further facilitate an overview of the project´s intended activities, Germany welcomes the inclusion of quantitative indications in the description of component 3 on how many pilot projects, regulatory measures etc are planned.

Response:
Each country child project includes a project results framework with quantitative indicators and end-of-project targets to measure the number of pilot projects, regulatory measures, etc., achieved/developed within the framework of the GEF project. However, at the time of submission of the Global Child Project, not all Country Child Projects (and in particular those 10 Country Child Projects submitted as part of the second round) have been finalized, and thus the exact amount of policies planned, business models envisaged and financial mechanisms to be set-up cannot not be provided.

· While the proposal provides a comprehensive overview of highly relevant initiatives and programmes, Germany welcomes including existent initiatives such as the Transformative Urban Mobility Initiative and the C40 Cities Finance Facility as well as upcoming initiatives such as TUMIVolt to enable exchange of experiences as well as potentials for future collaboration. This is especially relevant considering the planned future expansion of the proposed project to countries like Nigeria and Mexico which are partner countries to above mentioned initiatives.

Response:
UNEP has working relations with both TUMI as well as C40 (in particular through the “Zero Emission Bus Rapid-deployment Accelerator” (ZEBRA) initiative), and coordination with and involvement of both initiatives in the global e-mobility programme, especially through the activities implemented as part of the Regional Support and Investment Platforms, will be added to the project document.

· Germany welcomes the proposal´s reliance on IEA scenarios to lay out the project approach. To even further increase the proposal´s line of argument, Germany would welcome a very brief explanation on why the proposal focuses on the IEA´s B2DS and not on the 2DS scenario when describing the programme´s focus. This could for example be provided on page 26 in the first paragraph.

Response:
Work funded by the GEF working towards Climate Change Mitigation is related to the UNFCCC and the Climate Agreements achieved as part of the Conference of the Parties (COP). The Paris Agreement’s central aim is “to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius”. The IEA Beyond 2 Degree Scenario (B2DS) reflects this. Language can be added as suggested.

v Comment by James Woodsome, International Economist, O□ce of International Development Policy, International Affairs, U.S. Department of the Treasury, Council, United States made on 7/3/2019

Feasibility. The core of this proposal for Armenia deserves further scrutiny. The claim of 5,000 electric vehicles does not fit with other statistics, for example press reports citing the Minister of Nature Protection as saying that 30 electric vehicles were imported into Armenia in 2018. While there may have been a several-fold increase in electric vehicle imports in Armenia since 2016, those imports would have started from extremely low levels. That Armenia would

manufacture electric vehicles does not track with the fact there is no real manufacturing industry even for traditional petroleum fuel vehicles at present. Due to the ratcheting duties caused by incremental adoption of the Eurasian Economic Union (EAEU) common external tariff, Armenia will face steadily increasing prices for imports of cars from outside the EAEU, complicating the adoption of such technology. We encourage more background investigation before its basic feasibility can be established.

Response:
Regarding the question on Armenia, unfortunately there is a mistake with the short description of the Armenia child project baseline in Table 2 of the PFD. This will be corrected during the Child Project development and a note will be attached to the PFD to that effect. The 5,000 EVs mentioned and the local manufacturing actually belong to Ukraine. The US Council comment is right and Armenia imported about 30 EVs in 2018 (https://energyagency.am/en/page_pdf/tsragri-anvanoum). The project feasibility in Armenia will be further analyzed during development, but the government has prioritized the promotion of electric vehicles as one of the transport measures in their NDC. Armenia recently waived the VAT on EVs to stimulate the EV market (https://energyagency.am/en/category/noroutyounner-ev-mijocaroumner/elektromobilneri-nermoutsoumy-kazatvi-aah). In general, high import duties for vehicles can be an opportunity rather than a barrier for EV import. In case these duties are waived or reduced for EVs (to some extent that is already the case with the VAT exemption for EVs in Armenia), it provides a meaningful monetary incentive for customers to buy electric vehicles. EV market uptake in Norway is largely due to import and registration tax exemptions for EVs, while import of conventional cars is subject to high taxes. Yerevan has instituted an exemption of parking fees for EV's and has deployed some recharging infrastructure. Armenia already has a low emissions factor of about 0.4 tons of CO2/MWh and the introduction of EV's in Armenia would be able to reduce emissions with such a grid profile, and Armenia has introduced several policies to incentivize renewable power generation investments. For example, projects have been implemented or have been committed to improve energy transmission efficiency and reliability, and investment in renewables is taking off. This GEF project aims to demonstrate light duty vehicles in a government fleet in Yerevan, and in 2019, 23 charging stations will be installed through a GEF-6 funded Small Grant Programs implemented and led by UNDP. Promoting electric vehicles together with renewable energy will improve energy efficiency and further reduce CO2 emissions, air pollution and energy dependence in Armenia. This will be in full alignment with the countries' NDC and its strong commitment to the introduction of clean and sustainable energies.

v Comment by Lauren Céline Naville Gisnås, NORAD, Department for Climate, Energy and Environment, Council, Norway made on 6/29/2019

· We put great emphasis on cutting GHG emissions through electrification of the transport sector. We are of the opinion that if all take concerted action, it will drive down costs because of scale production.

· Every country has to choose their own path. However, an important lesson so far is that one needs to tax emissions. You need carrots and sticks. In line with general GEF principles of an enabling policy framework, one should pay attention to relevant tax policies when designing GEF programs, including policies for reducing fossil fuel subsidies.

Response:
The Child Country Projects all include work on the development of adequate policy frameworks to support the uptake of e-mobility – including regulatory, fiscal and other local measures. For example, some of the country projects include outputs on fiscal reforms in order to base registration and / or import taxation for vehicles on CO2 emissions or fuel consumption. In some of the countries (i.e. in some of the SIDS), work will be brought forward to liberalize the

power market and to allow the supply of power by independent power producers, which facilitates the introduction of renewable power generation and breaks the monopoly of subsidized petroleum fuel powered electricity generation.

[1] Harvard University: “COVID-19 PM2.5, A national study on long-term exposure to air pollution and COVID-19 mortality in the United States”, available at: https://projects.iq.harvard.edu/covid-pm

[2] Yaron Ogen, 2020, “Assessing nitrogen dioxide (NO2) levels as a contributing factor to coronavirus (COVID-19) fatality”, Science of The Total Environment, available at: https://www.sciencedirect.com/science/article/pii/S0048969720321215

ANNEX C: Status of Utilization of Project Preparation Grant (PPG). (Provide detailed funding amount of the PPG activities financing status in the table below:

PPG Grant Approved at PIF: **US$ 35,000**			
Project Preparation Activities Implemented	*GETF/LDCF/SCCF Amount (US$)*		
	Budgeted Amount	*Amount Spent to date*	*Amount Committed*
UNEP Sustainable Mobility Unit expert	22,988	22,065.88	
UNEP Sustainable Mobility Unit travel	6,012	6,934.12	
GEF project consultant	6,000	6,000.00	
Total	**35,000**	**35,000.00**	

ANNEX D: Project Map(s) and Coordinates

Please attach the geographical location of the project area, if possible.

Demonstration sites	*Latitude*	*Longitude*
Freetown, Sierra Leone	*8.484444*	*-13.234444*

The project will be piloted in Freetown, the country's capital city.

ANNEX E: Project Budget Table

Please attach a project budget table.

Expenditure category & detailed description	Component 1	Component 2	Component 3	Component 4	Sub-total	M&E	PMC	Total	Responsible entity
Goods	**0**	**68,931**	**0**	**0**	**68,931**	**0**	**0**	**68,931**	
Electric vehicle spareparts	0	10,000	0	0	10,000	0	0	10,000	EPA-SL
Price differential subsidies for electric 3-wheelers	0	58,931	0	0	58,931	0	0	58,931	EPA-SL
Contractual Services – Company	**5,250**	**0**	**5,250**	**1,750**	**12,250**	**32,400**	**6,000**	**50,650**	
Venue and catering services for workshops and events	5,250	0	5,250	1,750	12,250	0	0	12,250	EPA-SL
Venue and Catering for inception workshop and PSC meetings	0	0	0	0	0	2,400	0	2,400	EPA-SL
Mid-Term Review (optional)	0	0	0	0	0	10,000	0	10,000	UNEP Evaluation Office
Terminal Evaluation	0	0	0	0	0	20,000	0	20,000	UNEP Evaluation Office
Independent financial audits	0	0	0	0	0	0	6,000	6,000	EPA-SL
International Consultants	**19,250**	**42,625**	**49,500**	**44,000**	**155,375**	**0**	**0**	**155,375**	
International Policy, Business and Strategy expert	16,500	0	45,375	0	61,875	0	0	61,875	EPA-SL
International E-mobility Technical Support (UNEP SM Unit)	2,750	5,500	4,125	5,500	17,875	0	0	17,875	UNEP SMU
International E-Mobility Technology expert	0	37,125	0	0	37,125	0	0	37,125	EPA-SL
International Charging & Renewable Energy integration expert	0	0	0	22,000	22,000	0	0	22,000	EPA-SL
International Battery Technology expert	0	0	0	16,500	16,500	0	0	16,500	EPA-SL
Local Consultants	**0**	**10,500**	**9,000**	**0**	**19,500**	**0**	**0**	**19,500**	
National E-Mobility Technology Expert	0	10,500	9,000	0	19,500	0	0	19,500	EPA-SL
Salary and benefits / Staff costs	**11,000**	**18,000**	**5,750**	**3,500**	**38,250**	**0**	**32,500**	**70,750**	
Chief Technical Advisor	11,000	18,000	5,750	3,500	38,250	0	32,500	70,750	EPA-SL
Travel	**50,200**	**1,600**	**3,200**	**3,200**	**58,200**	**0**	**0**	**58,200**	
Travel for the International Policy, Business and Strategy expert	1,600	0	3,200	0	4,800	0	0	4,800	EPA-SL
Travel for the International E-mobility Technical Support (UNEP SM Unit)	5,000	0	0	0	5,000	0	0	5,000	UNEP SMU
Travel to attend Africa Support & Investment Platform events	36,800	0	0	0	36,800	0	0	36,800	EPA-SL
Travel to attend E-Mobility Global Programme events (DSA only)	2,200	0	0	0	2,200	0	0	2,200	EPA-SL
Travel to attend 2&3 wheeler working group	4,600	0	0	0	4,600	0	0	4,600	EPA-SL
Travel for the International E-Mobility Technology expert	0	1,600	0	0	1,600	0	0	1,600	EPA-SL
Travel for the International Charging & Renewable Energy integration expert	0	0	0	1,600	1,600	0	0	1,600	EPA-SL
Travel for the International Battery Technology expert	0	0	0	1,600	1,600	0	0	1,600	EPA-SL
Other operating costs	**310**	**0**	**0**	**0**	**310**	**0**	**0**	**310**	
Information materials	310	0	0	0	310	0	0	310	EPA-SL
Grand Total	**86,010**	**141,656**	**72,700**	**52,450**	**352,816**	**32,400**	**38,500**	**423,716**	

ANNEX F: (For NGI only) Termsheet

Instructions. Please submit an finalized termsheet in this section. The NGI Program Call for Proposals provided a template in Annex A of the Call for Proposals that can be used by the Agency. Agencies can use their own termsheets but must add sections on Currency Risk, Co-financing Ratio and Financial Additionality as defined in the template provided in Annex A of the Call for proposals. Termsheets submitted at CEO endorsement stage should include final terms and conditions of the financing.

Not applicable

ANNEX G: (For NGI only) Reflows

Instructions. Please submit a reflows table as provided in Annex B of the NGI Program Call for Proposals and the Trustee excel sheet for reflows (as provided by the Secretariat or the Trustee) in the Document Section of the CEO endorsement. The Agencys is required to quantify any expected financial return/gains/interests earned on non-grant instruments that will be transferred to the GEF Trust Fund as noted in the Guidelines on the Project and Program Cycle Policy. Partner Agencies will be required to comply with the reflows procedures established in their respective Financial Procedures Agreement with the GEF Trustee. Agencies are welcomed to provide assumptions that explain expected financial reflow schedules.

Not applicable

ANNEX H: (For NGI only) Agency Capacity to generate reflows

Instructions. The GEF Agency submitting the CEO endorsement request is required to respond to any questions raised as part of the PIF review process that required clarifications on the Agency Capacity to manage reflows. This Annex seeks to demonstrate Agencies' capacity and eligibility to administer NGI resources as established in the Guidelines on the Project and Program Cycle Policy, GEF/C.52/Inf.06/Rev.01, June 9, 2017 (Annex 5).

Not applicable