



Part I: Project Information

Name of Parent Program

Global Programme to Support Countries with the Shift to Electric Mobility.

GEF ID

10275

Project Type

MSP

Type of Trust Fund

GET

CBIT/NGI

CBIT **No**

NGI **No**

Project Title

Support the Shift to Electric Mobility in Madagascar

Countries

Madagascar

Agency(ies)

UNEP

Other Executing Partner(s)

Ministry of Environment and Sustainable Development of Madagascar

Executing Partner Type

Government

GEF Focal Area

Climate Change

Sector

Transport/Urban

Taxonomy

Focal Areas, Climate Change, Climate Change Mitigation, Sustainable Urban Systems and Transport, Influencing models, Strengthen institutional capacity and decision-making, Transform policy and regulatory environments, Demonstrate innovative approaches, Stakeholders, Private Sector, Individuals/Entrepreneurs, SMEs, Capital providers, Large corporations, Financial intermediaries and market facilitators, Type of Engagement, Participation, Information Dissemination, Consultation, Civil Society, Academia, Non-Governmental Organization, Communications, Public Campaigns, Awareness Raising, Gender Equality, Gender Mainstreaming, Women groups, Beneficiaries, Sex-disaggregated indicators, Gender results areas, Access to benefits and services, Capacity, Knowledge and Research, Innovation, Capacity Development, Knowledge Generation, Learning, Knowledge Exchange

Rio Markers**Climate Change Mitigation**

Principal Objective 2

Climate Change Adaptation

No Contribution 0

Biodiversity

No Contribution 0

Land Degradation

No Contribution 0

Submission Date

4/12/2023

Expected Implementation Start

1/1/2024

Expected Completion Date

12/31/2027

Duration

48In Months

Agency Fee(\$)

102,839.00

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	1,142,661.00	3,530,000.00
Total Project Cost(\$)			1,142,661.00	3,530,000.00

B. Project description summary

Project Objective

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.

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
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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 establishes an institutional framework and adopts a strategy for the promotion of low-carbon electric mobility	<p>1.1. An inter-sectoral subcommittee on electric mobility is established within the National Committee on Climate Change (CNCC)</p> <p>1.2. A national gender-sensitive electric mobility strategy is developed and submitted to the government for approval</p> <p>1.3. A knowledge management and capacity building plan on electric mobility is prepared, and key stakeholders from public and private sectors are trained through national and Global</p>	GET	195,010.00	60,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
			Programme activities			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
Component 2. Short term barrier removal through low-carbon e-mobility demonstrations	Investment	2. Demonstrations provide evidence of technical, financial and environmental sustainability to plan for scale-up of low-carbon electric mobility including optimized public transport bus services	2.1. As a prior step for electrification, recommendations are provided to the optimization of operations in one public transport corridor in Antananarivo, reserving the trunk lines to higher capacity vehicles including larger buses and the feeder lines to low-capacity transport means such as 2&3 wheelers Output 2.2. As a prior step for electrification, support is provided to the optimization of the public transport system of Toamasina through the transition towards trunk lines to be served by higher capacity vehicles (buses and minibuses) and the	GET	549,140.00	100,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
			relocation of current low-capacity means (3 wheelers) as feeders of the principal lines and low-demand routes			
			Output 2.3: A pilot monitoring system is implemented in the selected public transport corridor in Antananarivo and a roadmap is prepared for future electrification, in synergy with the actions of the municipality to optimize the network and the national government's support to the introduction of larger buses			
			2.4: A pilot monitoring system is implemented along the planned trunk lines in Toamasina,			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
			<p>and a roadmap is prepared for the electrification of the fleet, including current low capacity vehicles (3Ws) and future buses</p>			
			<p>2.5: The feasibility of the electrification scheme is validated in what refers to technical specifications of 2Ws in Antananarivo, through the operation of one public and one private 2W fleets, and evaluation reports are submitted to the government</p>			
			<p>2.6: The feasibility of the electrification transition is validated in what refers to the replacement of conventional</p>			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
			<p>3Ws by electric ones in public transport services in Toamasina, through a scrappage scheme providing incremental incentives to operators, and evaluation reports are submitted to the government</p>			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
Component 3. Preparing for scale-up and replication of low-carbon electric mobility	Technical Assistance	3. Conditions are created to shift market towards low-carbon electric mobility and accelerate introduction of appropriate electric vehicles in Madagascar	<p>3.1. Fiscal and regulatory reforms to incentivize the uptake of electric mobility are submitted to the government for approval</p> <p>Output 3.2: Financing schemes are developed and submitted for implementation, including procurement guidelines (e.g., technical specifications) for the scaling-up of the electrification of bus, 2&3W fleets</p> <p>Output 3.3. A communication plan is prepared and communication materials and campaigns are designed</p> <p>Output 3.4. Communication campaigns and project</p>	GET	149,400.00	2,842,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
			webpage are implemented, raising awareness and interest from key stakeholders and the general public			

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
Component 4. Long-term environmental sustainability of low-carbon electric mobility	Technical Assistance	4. Measures are developed to ensure the long-term environmental sustainability of low-carbon electric mobility	<p>Output 4.1: A study to integrate renewable power for electric vehicle recharging is carried out</p> <p>Output 4.2 The country's framework for e-waste collection is revised, in order to integrate electric vehicle batteries</p> <p>Output 4.3: Training and technical support is provided to handle used EV batteries from 3Ws in Toamasina, and a scheme for collection, re-use, recycling and sound disposal of used electric vehicle batteries is developed and submitted for adoption</p>	GET	88,100.00	20,000.00

Project Component	Financing Type	Expected Outcomes	Expected Outputs	Trust Fund	GEF Project Financing (\$)	Confirmed Co-Financing (\$)
Monitoring and Evaluation	Technical Assistance	5. Project is effectively monitored and evaluated	5.1 Monitoring and evaluation products are delivered (see section 9 and Annex J)	GET	57,133.00	
Sub Total (\$)					1,038,783.00	3,022,000.00
Project Management Cost (PMC)						
			GET	103,878.00		508,000.00
			Sub Total(\$)	103,878.00		508,000.00
Total Project Cost(\$)				1,142,661.00		3,530,000.00

Please provide justification

N/A

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	Ministry of Environment and Sustainable Development of Madagascar	In-kind	Recurrent expenditures	180,000.00
Recipient Country Government	Ministry of Energy, Water and Hydrocarbons	Public Investment	Investment mobilized	3,080,000.00
Recipient Country Government	Ministry of Energy, Water and Hydrocarbons	In-kind	Recurrent expenditures	80,000.00
Recipient Country Government	Ministry of Transport and Meteorology	In-kind	Recurrent expenditures	90,000.00
Other	Municipality of Antananarivo	In-kind	Recurrent expenditures	60,000.00
Other	Municipality of Toamasina	In-kind	Recurrent expenditures	40,000.00
Total Co-Financing(\$)				3,530,000.00

Describe how any "Investment Mobilized" was identified

The "investment mobilized" was identified through virtual bilateral meetings with the potential co-financiers within the country; previously, a presentation of the co-financing concept was presented during the first mission in Antananarivo and the project preparation workshop (August 2022). The Ministry of Energy and Hydrocarbons (MEH) will mobilize public investment resources for USD 3,080,000. The MEH is currently undertaking public investments for the construction and commissioning of the Sahofika hydroelectric development (with a total cost of 895 million US dollars in the form of a concession contract with the company NEHO and financed by a group of 12 lenders) and for the 22 kV distribution line linking Antananarivo and Toamasina (PRIRTEM I project, with an estimated total cost of US\$205,000,000). It is estimated that at least 40% of the planned investments will be carried out in the period 2023-2027, and that the contribution of these projects to the transition to electric mobility could be estimated at 0.7% of the total costs, i.e. 3,080,000 US dollars. The new Sahofika Hydroelectric Power Station will have an installed capacity of 205 MW and generate annually 1570 GWh. The estimated fleet of electric vehicles at the end of the project (2027) will annually consume 26.38 GWh. It was conservatively assumed that "11 GWh would be provided by Sahofika (0.7% of its annual generation) and the rest from other sources.

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(\$)	Total(\$)
UNEP	GE T	Madagascar	Climate Change	CC STAR Allocation	1,142,661	102,839	1,245,500.00
Total Grant Resources(\$)					1,142,661.00	102,839.00	1,245,500.00

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 **true**

PPG Amount (\$)

50,000

PPG Agency Fee (\$)

4,500

Agency	Trust Fund	Country	Focal Area	Programming of Funds	Amount(\$)	Fee(\$)	Total(\$)
UNEP	GET	Madagascar	Climate Change	CC STAR Allocation	50,000	4,500	54,500.00
Total Project Costs(\$)					50,000.00	4,500.00	54,500.00

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 ₂ e (direct)	0	751063	0	0
Expected metric tons of CO ₂ e (indirect)	0	1751370	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 ₂ e (direct)				
Expected metric tons of CO ₂ e (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 ₂ e (direct)		751,063		
Expected metric tons of CO ₂ e (indirect)		1,751,370		
Anticipated start year of accounting		2024		
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)		9,412,662,675		

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)
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Indicator 11 People benefiting from GEF-financed investments

	Number (Expected at PIF)	Number (Expected at CEO Endorsement)	Number (Achieved at MTR)	Number (Achieved at TE)
Female		12,052		
Male		8,210		
Total	0	20262	0	0

Provide additional explanation on targets, other methodologies used, and other focal area specifics (i.e., Aichi targets in BD) including justification where core indicator targets are not provided

Beneficiaries: The estimate of direct project beneficiaries is based on the following assumptions: ? Drivers: Assuming 2 drivers per each electric 2-3W used in the demonstrations: 140 drivers (21 women and 119 men). ? Mechanics: 1 woman and 9 men. ? Users: each vehicle with an average occupancy of 2 passengers per trip, providing services 20 days per month and 20 trips per working day. As the number of EVs is limited, the same person is likely to make use of an electric vehicle no more than twice per month. Therefore, the total number of individuals using these services would be 20,000 users, with a share of 60% women and 40% men. ? Decision makers trainings: 2 training sessions with 10 participants each (10 men, 10 women). ? Various technical trainings: 8 training sessions on driving and 2 training sessions on vehicle maintenance, and 2 trainings on end of life management of EVs and batteries (11 women, 63 men). ? A maximum of 18 participants in the following regional international events: the regional trainings on electric 2-3 wheelers, the regional marketplace and financing workshops, and any other relevant regional / international event organized by the Global E-mobility Programme (9 women and 9 men).

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.).

The Madagascar child project components have been reworded as follows:

Concept Note statement	CEO Endorsement Document statement	Explanations for the changes
Component 1: Institutionalization of electric mobility	Component 1. Institutionalization of low-carbon electric mobility	Harmonization of country child project component statements across the Global Electric Mobility Programme

Concept Note statement	CEO Endorsement Document statement	Explanations for the changes
<p>Component 2: Electric vehicle demonstrations.</p> <p>This will introduce up to 10 electric cars, 80 electric motorcycles and 40 3-wheelers within captured fleets as well as demonstrate solar recharging in Antananarivo and Toamasina.</p>	<p>Component 2. Short term barrier removal through low-carbon e-mobility demonstrations.</p> <p>A 3-stage approach in Antananarivo and Toamasina, including optimization of the public transport system, a roadmap for electrification and operation of 25 e2W in one public fleet and 20 e2W in one private fleet in Antananarivo and 25 e3W in public transport in Toamasina.</p>	<p>Harmonization of country child project component statements across the Global Electric Mobility Programme.</p> <p>The private operators identified at the Concept Note stage lacked the financial capacities to undertake the necessary investments in EVs, even with the project's support. The current lack of a PT planning framework is a source of uncertainty to invest in the PT sector, and for its electrification. The new focus on optimization of the PT systems is well aligned with the priorities of the national government and of both municipalities and to the actual capacities of fleet operators and to the expected availability of EVs in Madagascar during the project lifetime.</p>
<p>Component 3: Preparation of scale-up and replication of electric mobility</p>	<p>Component 3. Preparing for scale-up and replication of low-carbon electric mobility</p>	<p>Harmonization of country child project component statements across the Global Electric Mobility Programme</p>
<p>Component 4: Promotion of long-term sustainability of electric mobility</p>	<p>Component 4. Long-term environmental sustainability of low-carbon electric mobility</p>	<p>Harmonization of country child project component statements across the Global Electric Mobility Programme</p>

Concept Note statement	CEO Endorsement Document statement	Explanations for the changes
The project will mitigate 5,665,780 (metric tons of CO ₂ e) greenhouse gas emissions, of which 3,259,210 are direct and 2,406,570 are indirect.	The project will mitigate 2,502,433 tons CO ₂ e greenhouse gas emissions, of which 751,063 are direct and 1,751,370 are indirect.	The initial estimates were based on the assumption of a massive electrification of 3Ws during the project, with significant investment of the private sector. These pre-COVID expectations have proved unrealistic during project design. More accurate estimates based on UNEP's E-mob Model and more realistic assumptions based on the actual contents of the demonstrations.
Co-financing focusing on component 2 (pilot project)	Co-financing now focusing on component 3 (enabling framework)	Some of the co-financing initially identified in the Concept Note is no longer feasible, as SAS decided not to undertake activities in Madagascar and the investments initially envisaged by MEDD have been cancelled. The contents of component 2 were revised accordingly. At the time of the Concept Note, MEH had not quantified its contribution. The quantification provided now has substantially increased the contribution to Component 3, which is consistent with the need to substantially improve the electric system in Madagascar as a precondition to transport electrification.

Table 1: Changes in project components

The committed co-finance to the Madagascar child project has evolved compared to the estimates that had been provided in the PFD. The following table provides an overview of the changes:

Co-finance partner	Estimated co-finance contribution as per the PFD (US\$)	Committed co-finance at CEO Endorsement (US\$)	Explanation for the changes
Ministry of Environment and Sustainable Development	3,696,000	180,000	MEDD is not carrying out the investments initially envisaged and is providing in-kind resources.
Ministry of Energy and Hydrocarbons	TBD	3,160,000	MEH has identified its contributions, including public investment and in kind resources.

Ministry of Transport and Meteorology	TBD	90,000	TMT has identified its in-kind contributions.
Save And Sustain (SAS) the environment	450,000	-	SAS is not planning to undertake activities in Madagascar.
Transport Sakaiza	TBD	-	TS has not the capacities to undertake the activities initially envisaged.
Municipality of Antananarivo	-	60,000	Linked to the new demonstration activities in Antananarivo
Municipality of Toamasina	-	40,000	Linked to the new demonstration activities in Toamasina
Total	TBD	3,530,000	

Table 2: Changes in project co-financing

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- emission mobility is essential to meet 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]¹, this is expected to grow to one-third by 2050. In addition, the transport sector is a leading contributor to short-lived climate pollution, especially black carbon.

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]². By 2050 two out of three cars will be found in developing countries[3]³.

This means that achieving global climate targets will require a shift to zero emissions mobility in all countries, including low- and middle-income ones. In the absence of action in these countries, it can be expected that the exponential growth of mobility demand will be met with conventional and outdated vehicle technologies phased out in the more developed world and exported from them to these markets at discounted prices.

Facing multiple challenges, local and national governments in low- and middle-income countries struggle to address the mobility needs of their population, particularly in large cities. The insufficiency of the governments' response encourages the proliferation of under-regulated or even informal urban transport services, with poor environmental performance, safety records and working conditions. The role of two-wheeler (2Ws) and three-wheeler (3Ws) vehicles is particularly controversial in this regard, as their characteristics and use are hardly consistent with sustainable mobility principles. However, the transition to mobility systems based on regular public transport and soft modes requires to strengthen the institutional framework, infrastructure investments and financial support to operators. During the transition towards reliable urban bus services, 2Ws and 3Ws remain a reasonable bridging solution to provide affordable mobility in congested urban areas, and the use of low- and zero-emission vehicles can reduce its environmental footprint.

Energy-dependence, especially on fossil fuels, is a crucial barrier for development and sustainability. As the transport sector typically claims the lion's share of fossil fuel consumption, its electrification provides a promising strategy to reduce dependency, especially in countries with favorable natural conditions (hydro, sun or wind) for low-carbon electricity generation.

Root causes and barriers:

Madagascar is an island nation off the southeast coast of Africa which lies 400km east from the Mozambique coast. Categorized as a least developed country (LDC), Madagascar is a member of both the Southern African Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA). Madagascar has an area of 587,295 km² and as of 2018 had a population of about 25 million inhabitants of which 35% were in urban areas and 77% in rural areas. About 4 million of Madagascar's population reside in the economic and political capital city of Antananarivo.



Figure 1: Map of Madagascar

The capital city is located in the mountainous Central Highlands region of Madagascar. Although the city's topography makes it challenging to develop road infrastructure, the city is the starting point of all national roads in the country. Antananarivo also houses a station that serves the railway lines of Antananarivo East Coast or "TCE line" and Tananarive Antsirabe or "TA Line" which are no longer operational. There are major mobility problems in the city leading to traffic congestion and air pollution, with corresponding negative impacts on the economy and quality of life of the residents. Toamasina, is the second largest city in Madagascar with 326,286 inhabitants[4]⁴, after Antananarivo. The city is in the eastern part of Madagascar and lies along the Indian Ocean. Toamasina is

Madagascar's commercial hub and foremost port, handling much of the island's foreign trade and it is the terminus of the railway from Antananarivo.

After years of sluggish economic growth, the country's GDP grew by 4.4% in 2019 (which can be associated to the normalization of the political situation that followed the 2018 presidential election), but the COVID pandemic resulted in a significant GDP contraction in 2020 (-7.1%). The subsequent recovery in 2021 was modest (4.4% growth), not only due to a delayed reopening of the economy but also to the natural disasters that hit the country (cyclone Batsirai and a severe drought in the south, leading to a food insecurity crisis). IMF GDP growth prospects are optimistic (initially +5.4% in 2022, later revised down to 2.2%, +4.2% in 2023 and + 4.6% in 2024). Two significant risks for budgetary stability are the fuel price stabilization mechanism (the government's liability to fuel distributors is growing as international oil prices started to escalate in mid-2021) and the growing deficits run by the Malagasy electricity and water agency (Jiro sy rano Malagasy, JIRAMA) (World Bank, 2019. Least-cost Electricity Access Development Project Appraisal document, International Monetary Fund (IMF) 2022 Country Report).

As stated in its Intended Nationally Determined Contribution (INDC) in 2016, Madagascar is committed to contribute to climate change mitigation, as well as reduce climate change vulnerability and promote adaptation measures: In 2030, Madagascar aims to reduce approximately 30 MtCO₂ of its emissions of greenhouse gases (GHG), representing 14% of national emissions, compared to the business-as-usual (BAU) scenario, with projections based of GHG inventory from year 2000 to 2010. This reduction is additive to the expected increase in the absorptions of the Land Use, Land Use Change and Forestry (LULUCF) sector, estimated at 61 MtCO₂ in 2030. Total increase in GHG absorption is expected at 32%, compared to the BAU scenario. The government is currently preparing its revised nationally determined contribution (NDC).

Access to electricity in the country has been growing, but remains low, reaching in 2020 a percentage of the population of 33.7% nationally, 70.2% in urban areas and 10.9% in rural areas^[5]. The country has huge potential for the generation of green, competitive, and renewable energy (wind, solar and hydropower): its hydroelectric potential is estimated at 7,800 MW, and its solar energy potential is estimated at 2,000 kWh/m²; wind energy potential is estimated at 2,000 MW.

All fossil fuels consumed in Madagascar are imported. One of the objectives of the government of Madagascar (GoMG)'s energy policy is to provide all districts in the country with at least one fuel selling point. The GoMG's policy on the electrical energy sector pursues that 50% of the Malagasy population will have access to electricity at a socially acceptable price by the end of 2023, doubling the means of electricity production in five years (i.e. 1251 MW at the end of 2023). The current generation capacity of the system is provided in Table 3. Key current challenges in the electricity subsector include insufficient generation capacity and excessive dependance on fossil fuels.

	Installed power (MW, 2021)	Foreseen (MW, 2025)
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Thermic (fossil fuels)	465	570
Hydroelectric	171	249
Solar	27	275
Hybrid[6] ⁶	5	166
Total	668	1,260
Source: MEH and Third National Communication		

Table 3: Sources of electricity generation

Electricity production figures in the last years (table below) shows a small growth, largely based on thermic plants, which have increased their production and share between 2018 and 2021. This results in specific GHG emissions from electricity generation of 425 kg CO₂e/MWh in 2020, although other studies present much lower figures (243 kg CO₂e/MWh in 2020, in accordance with IRENA[7]⁷). In line with GoMG's plans to increase the country's power generation capacity[8]⁸, the grid emission factor is envisaged to drop to 117 kgCO₂e/MWh by 2030.

	2018 (MWh)		2019 (MWh)		2020 (MWh)		2021 (MWh)		Av.An.growth
Thermic	828,456	46.1 %	973,518	52.3 %	1,018,476	55.5 %	1,143,342	59.8 %	11.3%
Hydroelectric	968,331	53.9 %	886,277	47.7 %	817,906	44.5 %	767,309	40.2 %	-7.5%
Total	1,796,786		1,859,797		1,836,382		1,910,682		2.1%
Source: JIRAMA[9] ⁹									

Table 4: Electricity production by JIRAMA in Madagascar

Dependency on fossil fuels for electricity generation should decrease in the near future, as the GoMG is engaged in the completion of different projects to increase the country's electricity generation capacity,

mostly based on renewables (Table 5). The GoMG has also identified fifteen additional hydroelectric projects as candidates for future investment[10]¹⁰.

	Technology	Power (MW)	Year of completion[11]¹¹
Expansion of Ambatolampy (Green Yellow)	Solar	20	2022
Mahitsy	Hydroelectric	28	2021
Andekaleka (4 th group)	Hydroelectric	33.2	2022
Sahofika (Phase I)	Hydroelectric	192	2026
Volobe	Hydroelectric	121	2025
Mandraka 3	Hybrid	5 (1 MW solar)	2023
Jirama (hybridation of termal plant)	Hybrid	NA	NA
Source: MEH			

Table 5: New projects on electricity generation

The third GHG national inventory was completed by Madagascar in the context of the preparation of its Third National Communication to the UNFCCC, submitted in 2017. The inventory covers the 2005-2010 period. It shows that Madagascar remains a significant sink of GHG emissions, although such capacity has decreased. Whereas emissions have been stable throughout the period (148,389 Gg CO₂e in 2005 and 151,672 Gg CO₂e in 2010), the sink capacity has significantly decreased, from 280,2564 Gg CO₂e in 2005 to 220,094 Gg CO₂e in 2010.

In accordance with the Third Inventory, the sectors that account for the largest proportion of national GHG emissions in 2010 are land use change and forestry at 123,915 Gg CO₂e and agriculture at 24,056 Gg CO₂e. Energy emissions are not properly disaggregated, and amount to 2,991 Gg CO₂e. Estimates from WRI's Climate Access Indicators Tools (CAIT[12]¹²) for 2014-2016 shows similar values.

An estimate of the impact of the transport sector on total energy use related emissions can be made based on the country's energy balance. Data from UNEP[13]¹³ for the year 2010 indicate a total energy

consumption of 1,147 ktoe including charcoal (453 ktoe, for cooking), cooking coal (6 ktoe, for industry), total oil products (615 ktoe, for transport, industry and power generation) and electricity (73 ktoe). Accordingly, transport accounted for about 30% of total energy use, ranking second just after the use of charcoal for cooking. This is in line with GHG emission data provided by the CAIT database, showing a share of 22% of transport GHG emissions on total energy related GHG emissions for the years 2010 and 2018 (table 6). The CAIT database also implies that transport emissions grew by almost 50% between 2010 and 2018, making transportation a key sector to reduce future emissions.

Source	2010 TNI	2010 CAIT	2018 CAIT
Energy	2.99	3.89	5.93
Of which, transport	0.99	0.894	1.31
Industrial processes	0.20	0.43	1.06
Agriculture	24.06	24.16	22.67
LULUCF	123.91	23.00	10.72
Waste	0.51	0.72	0.91
Total	151.67	52.19	41.29
Source: Third National Inventory for 2010 and WRI's CAIT for 2010 and 2018			

Table 6: GHG emissions by sector (all values in 1,000 Gg CO_{2e})

Official statistics do not provide figures on the vehicle stock for the whole country. There is information on vehicle registrations for Antananarivo since 2010 and for Toamasina in the last years, as presented in the table below. Considering that the number of registrations in 2006 in Antananarivo was 11,527 vehicles^[14]⁴, it can be concluded that there was no significant growth in the number of registrations until 2019, and that there was a significant decrease in 2020 as a result of the COVID pandemic. These trends are far away from the assumptions established in Madagascar's Third National Communication, which foresaw a steady growth of new registrations, to reach 40,708 in 2020 and 65,560 in 2025.

Official documents^[15]⁵ and local stakeholders agree in the main mobility challenges in Antananarivo. These include the limited capacity of the road network, the lack of adequate traffic management (signalization, red lights) and many drivers' disregard of basic traffic rules. Furthermore, the high concentration of activities in certain central areas of the city generates strong radial traffic flows with

the periphery and congestion in the center and in the radial corridors. The provision of efficient public transport (PT) service is jeopardized by insufficient coordination between the national and local government: whereas the municipality has the competences for public transport services within the city borders, suburban services linking the city with other municipalities in the metropolitan area are under the competences of the Ministry of Transport and Meteorology (MTM). At any rate, the quality of PT services is low, among other reasons due to the use of low-capacity buses (minibuses locally known as *?taxi-b??*), many of them operating well beyond their reasonable lifespan and not complying with minimum safety and emission standards. Most of the PT vehicles are owned by small operators (owning just a few units), grouped into cooperatives, and licensed to serve specific PT lines. These cooperatives are associated in two organizations: *Union de Coop?ratives de Transport Urbain* (UCTU) and *Fitaterana mirindra ho an?Antananarivo* (FMA). Fares are regulated and have been kept low for years (currently just MGA 600 or USD 0.15), creating increasing financial difficulties to operators and making the renewal of the fleet all but impossible. To address the operators' increasing concerns, the President's office announced in July 2022 a scheme to import 1,000 buses to renew the fleet, providing a 50% subsidy on the purchase price to operators, but it has not materialized yet.

Mobility conditions in Toamasina have progressively deteriorated: its reduced paved road network (just 70 km), with at least 40% in poor condition is becoming more and more unsuitable to accommodate bus and car traffic, and 3-wheelers seized this opportunity to progressively displace all buses from the 4 lines they served, as well as many taxi services. Although initially regulated by the municipality and assigned to concrete lines, the municipality does not have the resources to properly control the system, and there is evidence that a significant number of unauthorized 3Ws are also operating in the city.

The number of bicycles and *cyclo-pousses* (rickshaws) registered in Toamasina is, respectively, 8,421 and 9,600, jointly accounting for 55% of the vehicle fleet; the number of registered motorcycles is 11,709 or 35% of the total and the number of tuk-tuks is 1,246 or 4% of the total, in accordance with the information provided by the municipality. All these transport modes, together with walking, largely dominate mobility in the city. Traffic speed is low, as motorized vehicles must accommodate to the slow motion of rickshaws. Tuk-tuks provide shared mobility services along the four lines formerly served by buses, and one of them is served by electric tuk-tuks, although with low speeds, as most of them are equipped by lead batteries. One operator has recently introduced lithium battery vehicles in its fleet, with good results, allowing higher speeds and higher autonomy with reasonable investment and operating costs. The concentration of rickshaws at critical destinations (like the four markets in the city center), the high number of heavy-duty vehicles generated by the port activity, lack of parking space and the dissemination of road passenger transport terminals throughout the city (as the official road terminal is out of service) create additional challenges to traffic operations. Another issue of concern is the lack of professionalism, insurance and knowledge of traffic rules by rickshaws' (and other vehicles?) drivers, locally known as *jockeys*.

When comparing Antananarivo and Toamasina it is clearly visible that the transport systems are structurally different. While there are more than twice as many cars registered compared to 2&3 wheelers in Antananarivo, the number of registered 2&3 wheelers is 50% higher than that of cars in Toamasina. In addition, public service transportation is mainly covered by 20-seater minibuses in Antananarivo, often very old Mercedes Sprinters operated by one of the numerous private bus

operating companies, and the use of 2&3 wheeler vehicles for commercial passenger transport is not allowed. In Toamasina, 2&3 passenger transport is allowed, and a fleet of more than 2,000 3W taxis is servicing the bulk of public transport demand. In addition, a large number of individually owned two-stroke internal combustion engine (ICE) powered 50cc scooters can be observed in Antananarivo, significantly contributing to air pollution due to the poor technical performance of these vehicles (new scooters imported from China or old second-hand scooters imported from Europe, mainly France).

It can be concluded that conventional public transport is somewhat more consolidated in Antananarivo, and that 2&3 wheelers are a more relevant transport mode in Toamasina. This is consistent with the qualitative information obtained from local stakeholders, which also suggest that 3W registrations are growing faster than 2W's (official data is not differentiating among both). The strong growth of the three-wheeler fleet in Toamasina, would reflect the lack of public transport alternatives to satisfy travel demand. The 3W technology is simple, based on engines with carburetors and no emission control. They are thus highly polluting and contribute to deterioration of air quality in urban areas. Some private sector players have started importing and operating electric in Toamasina, since 2014 three-wheelers (initially with lead batteries and more recently lithium batteries although with limited power), although their operation is authorized only in some routes due to their low speed.

	Antananarivo			Toamasina	
	2018	2019	2020	2020	2021
New registrations in the year	10,749	10,699	8,361	1,885	2,342
Of which, cars	4,306	4,276	3,560	420	473
Of which, 2&3 Wheelers	2,333	1,477	1,394	652	898
Of which, public transport vehicles (minibuses and buses)	NA	1,524	886	213	290
Source: INSTAT					

Table 7: New vehicle registrations by categories in Antananarivo and Toamasina

The official statistics also provide information in total vehicle registrations in Antananarivo, as presented in Table 8. Assuming that these registrations may represent 70% of the national total^[16], this information serves as a basis for estimating the project's expected GHG emission savings (Annex M). Registrations peaked at the beginning of the past decade and have not recovered yet, first due to the political and economic disruptions and more recently due to the COVID pandemic. It is worth noticing the strong decrease in the importation of used vehicles since 2017, which was accelerated by the pandemic.

Year	New 4W	Used Imported	New 2W	Total	Of which, cars
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2012	10,111	6,300	8,176	24,587	5,893
2013	10,091	5,623	7,624	23,338	5,943
2014	8,303	5,417	5,691	19,411	5,798
2015	4,196	4,287	6,169	14,652	4,890
2016	8,946	4,354	5,098	18,398	5,112
2017	5,754	6,004	3,908	15,666	5,472
2018	3,048	5,376	2,325	10,749	4,306
2019	5,539	3,460	1,353	10,352	4,327
2020	6,146	679	1,353	8,178	3,546
2021	7,294	72	4,278	11,644	3,564

Table 8: Vehicle registrations in Antananarivo

Despite having onshore oil reserves, Madagascar does not have local refining capability anymore and depends on imports of refined petroleum products. Petroleum fuel takes a significant share of total national imports. In 2018 for example, fuel imports constituted 16.9% of all merchandise imports for the country. Madagascar implemented fossil fuel subsidies in the past (2014-2015), which were subsequently replaced by a reference calculated price and a price-smoothing mechanism. Due to ever rising international fuel prices, the mechanism has resulted in growing liabilities for the government vis-?-vis fuel importers. Before the price peak in the summer of 2022, fuel prices at the pump were around USD 1.1 per liter for gasoline, with before-tax prices significantly higher than in other countries in the region due to higher transport prices and higher distribution margins, as the fuel market is dominated by an oligopoly of four companies, with no incentives to compete. Oil dependency has therefore become a key barrier to socioeconomic development[17]¹⁷.

According to the INDC of Madagascar (2015), the country aims to reduce its GHG emissions by 14% by 2030 compared to a Business-as-Usual (BAU) scenario. The INDC included the promotion of renewable energy to meet power demand, and the GoMG has undertaken prefeasibility surveys in many sites. However, the INDC did not foresee specific actions in the transport sector. Without any intervention, transport energy demand and CO₂ emissions are projected to grow at rates similar to those observed over the past decades, leading to increased emissions, air pollution and import expenditure in petroleum fuel.

The transport sector is a key enabler to sustained economic growth but lack of infrastructure, influx of large amounts of old and polluting vehicles and an underdeveloped public transport sector are

hampering the sustainable movement of people and goods in Madagascar, with a disproportionate carbon footprint compared to the low motorized mobility levels in the country.

The objective of this project is to support Madagascar with the shift to electric vehicles and improvement of public transportation through (1) institutionalization of e-mobility and capacity building; (2) development of a supportive e-mobility policy and financing framework; (3) generation of on-the-ground experience with e-mobility starting with electric 2&3 wheelers in Antananarivo and Toamasina; and (4) preparation for long term sustainability of electric mobility through development of proposals for battery end-of-life management and renewable power integration. These actions are coupled with a strategy to improve sustainable urban mobility in both cities, decoupling increasing transport demand from energy use and CO₂ emissions. Additionally, the potential of electrification in the facilitation of rural mobility will be explored, as part of the long-term sustainability studies carried out with the help of this project to better integrate e-mobility with the deployment of renewables (as off-grid renewables in rural areas could be associated in future to the provision of electric bicycles and 2Ws).

The project intends to address the increasing dependence in Madagascar on transport means with a high carbon and environmental footprint, either due to the use of old and low technology standard vehicles or due to the general trend towards low-capacity vehicles for public transport services. The introduction of electric mobility in Madagascar is to help change this trend, through creating awareness for e-mobility to incentivize a replacement of dirty and fuel-consuming vehicles such as for example the large fleet of individually owned 2-stroke scooters, and to generally improve public transportation by exploring new ways of financing public transport projects, based on this new technology which can leverage substantial long-term savings through reduced energy and health costs.

Electric mobility is still a very novel technology in Madagascar, and has, apart from a couple of hundreds electric 3Ws used for public transport services in Toamasina, not seen a wider adaptation so far. This is due to a variety of causes, which can be summarized as follows: (1) institutional weakness to develop and implement innovative low-carbon policies for the transport sector; (2) limited capacities and financial resources and difficult access to financing for transport operations resulting in a strong focus on short-term benefits and impeding technical innovation, as this requires higher up-front cost; (3) market failure, including (3a) regulatory barriers allowing for the importation of sub-standard used an new vehicles; (3b) absence of financial mechanisms and business models to invest in new technologies such as electric mobility; and (3c) undersupply of the market with electric vehicles; (4) weak environmental quality management, currently resulting in the pervasive use of outdated technologies with a disproportionate carbon and environmental footprint and potentially creating a high environmental impact if the transition to e-mobility takes place.

The causes behind the **institutional weakness** to implement innovative, low-carbon policies in the transport sector include: (1a) limited horizontal coordination within the government between transport, environment and energy policies (e.g. national energy and climate change policies do not include transport as a relevant sector for action, and national transport strategies do not integrate environmental objectives- such as climate change or resource consumption- within their objectives); (1b) limited vertical coordination between the national and local governance layers. For example, urban mobility competences have been recently transferred to local governments without the necessary resources to

properly address them, and local and national government initiatives (e.g. presidential projects such as the Antananarivo cableway) are being implemented in absence of an integrated sustainable mobility vision for the country / city (the latest plan, from 2004 is outdated and the recently issued *Schéma Directeur des Transports pour la ville d'Antananarivo (SDT)*, focuses almost exclusively on new infrastructure needs); (1c) a significant limitation in terms of capacities and access to international best practices, which results in difficulties at the implementation stage, with plans not materializing to reality. Coupled with a difficult context, including political instability or limited access to financing, this has led to the deterioration of the quality of service of urban public transportation in Antananarivo^[18], and in the case of Toamasina to the replacement of regular bus services by privately owned 3-wheelers operations.

The causes behind transport operations currently focusing on short-term benefits and impending technical innovations include: (2a) weak transport planning, relegating pedestrians and public transport and leading to inefficient public transport operations; in Antananarivo, long PT lines provide slow periphery-center services with small and old vehicles, instead of creating priority corridors with high-capacity vehicles to be complemented by feeding lines operated by smaller vehicles or even 3Ws; in Toamasina, the replacement of buses by 3Ws has increased congestion and safety problems, and reduced the quality of service. (2b) Degrading financial conditions of the public transport system, due to the very low purchase power of the population, which require for example policy interventions such as capped public transport fares at very low rates; currently, a single trip in a minibus in Antananarivo costs less than USD 0.20, which in combination with high fuel prices renders public transport services (which are fully provided by small private fleet operators) an unattractive business; the situation is even more complicated in Toamasina, where operators rely on cheap (but fuel intensive) 3Ws. The low and uncertain income flows with low turnover and little own capital of privately owned public transport operators prevent access to financing to invest into better vehicles and therefore provide better service in both cities. The PT system is stalled in these degraded financial conditions by the absence of government support (through government's owned public transport operators or public-private partnerships) prevents the adoption of measures which could eventually provide financing through bilateral development projects or financing instruments provided by development banks. (2c) Besides the difficult financial context, fleet operators generally have limited knowledge of technological innovations and their advantages, in particular in what refers to e-mobility. In Antananarivo, this is not limited to PT operators; as traffic conditions have deteriorated, some fleet managers (including the municipal police as well as private corporations) increasingly rely on motorcycles, but have not even considered the possibility of using electric ones. In Toamasina, some 3W operators have gone electric, but choosing cheap lead-battery models with limited power and range, and needing frequent battery replacement, a hidden cost often not considered at the time of purchasing; these services are distrusted by users, creating a poor image for e3Ws.

The following causes can be Identified behind the existing **market failure resulting from regulatory barriers and absence of financial mechanisms to invest in e-mobility options**. (3a) The regulatory barriers slowing down or even blocking the deployment of sustainable mobility solutions in Madagascar and, in particular, the access of electric vehicles to the Malagasy market. Far from incentivizing electric and clean vehicles, the fiscal and regulatory framework penalizes the import of

new vehicles and particularly of eVs, as custom duties, levies and VAT are linked to the vehicle's price, which is higher for electric ones; Madagascar does not impose any age restriction on import of used vehicles and import duties are between 59 ? 118% of CIF (cost, insurance and freight) value of the vehicle; technical and quality standards have not been set up for electric vehicles yet, making the administrative vehicle registration process more difficult and allowing the import of sub-standard, slow, and range restricted eVs with lead-acid batteries, as it is the case for the close to 300 electric 3 wheeler taxis already in operation in Toamasina. The lack of adequate and innovation-friendly regulations is particularly harmful in the urban public transport sector, where operators rely on cheap second-hand, unsafe and polluting minibuses with rudimentary operation practices to remain profitable in a context of low fares and virtually no public support. (3.b) The absence of financial mechanisms and business models to invest in new technologies, such as electric mobility, include the lack of adequate financial products to support companies and individuals to renew their fleets (only short-term credit is available and at very high interest rates). Furthermore, fleet owners do not have access to reliable information and business models that could help them to compare medium and long-term costs of current fleet operations based on ICE vehicles with the alternative operation of eVs benefiting from operating and maintenance savings and eventually better financing offers to cover the higher upfront costs (for example in the 2&3W segments). (3c) The undersupply of the market with electric vehicles is related to the absence of financing mechanisms, which in combination with the small market for electric vehicles reinforces the reluctance of importers to offer electric vehicles in Madagascar. In addition, so far adequate maintenance service including availability of spare parts and skilled local capacity cannot be guaranteed.

The causes of the potentially high environmental impact that the transition towards electric vehicles could generate in Madagascar include (4a) the slow deployment of energy generation plants using renewable sources, which has increased the dependency of electricity generation on fuel-based plants with significant carbon footprint; (4b) the insufficient and under-enforced legislation on waste management, especially in what refers to e-waste; and (4c) the already weak system to manage waste, and in particular electric waste as well as vehicles at their end of life, could be overwhelmed with the arrival of electric vehicles requiring management procedures different from conventional vehicles, especially in what refers to batteries and to the potential to employ vehicle batteries in second life uses.

The problem tree with the barriers described above is summarized in Figure 2.

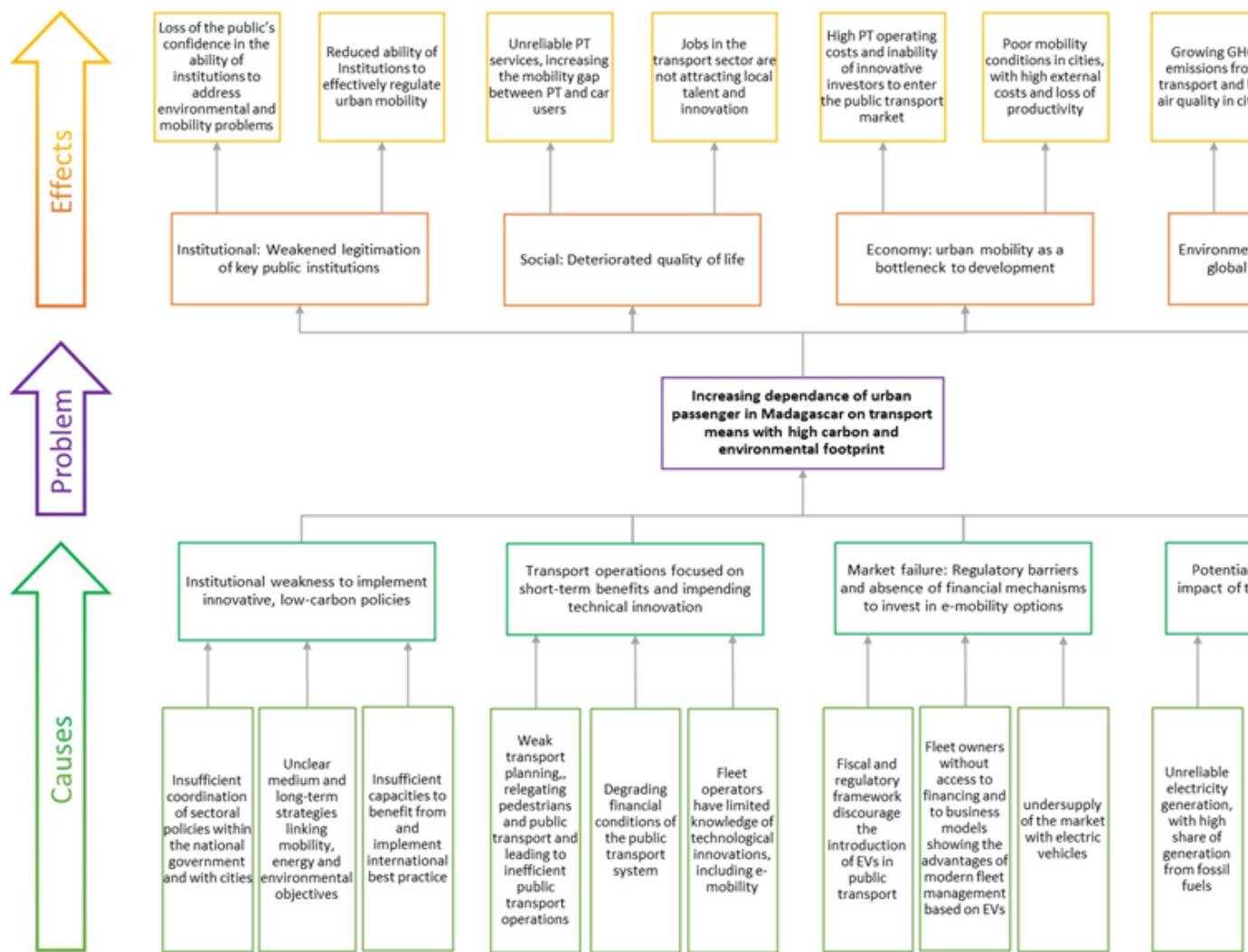


Figure 2: Problem tree

2) Baseline scenario and any associated baseline projects

Baseline scenario: socio-economic trends and government's strategies

The political context negatively affected Madagascar since 2009 until the return to constitutional order in 2013. Since then, economic growth averaged 3.5% per year until the COVID pandemic in 2020, when recession (-7.1%) was more severe than the Sub-Saharan Africa average^[19]¹⁹. Economic recovery was slow in 2021 and prospects from higher economic growth in 2022 were downsized by a

third COVID pandemic wave, from 5.4% to the current forecast of 2.5%. Economic growth should accelerate in 2023 and 2024, with current forecasts of 4.2% and 4.6%, respectively.

A National Development Plan (*Plan national de développement*, PND) was prepared by the Ministry of Economy and Finances (MEF) and implemented in 2015-2019. The PND includes considerations in the areas of decentralization, regional and urban development, and it identifies the lack of reliable access to electricity and the limitations of existing transport infrastructures as key bottlenecks for development. After the 2018 presidential elections, this plan was expected to be followed by a *Plan Emergence Madagascar 2019-2023* (PEM), but its preparation was stopped due to the COVID pandemic, and instead a *Plan Multisectoriel D'Urgence* (PMDU) was approved in July 2020; in 2021 the government resumed its activities for the preparation of the PEM, but it has not been approved yet.

Urban population trends.^[20] Population growth has traditionally been high, over 3% per year until 2010 and over 2.5% since then. Urban population growth has routinely outpaced total population growth, with average rates over 5% until 1995 and above 4.5% in the past decade. Population growth forecasts foresee a slow decrease in growth rates to reach 2.4% (total population) and 3.9% (urban population) in 2030 and 2.1% and 3.4% respectively in 2040. Annual average population growth in the three largest cities (Antananarivo, Toamasina and Antsirabe) has been above 5% until 2020 and is expected to stay over 4% until 2030.

Urban policy in Antananarivo

The main general framework for urban development in Antananarivo and Toamasina is provided by the Antananarivo-Toamasina corridor concept laid out in a master plan known by its acronym TaToM. It envisions the economic development of the two main metropolitan areas of the country and the communities along the connecting national road. The concept was developed by the Ministry of Spatial Planning, Housing and Public Works (*Ministère de l'Aménagement du Territoire, de l'Habitat et des Travaux Publics, MAHTP*) in 2019 with the support of the Japanese International Cooperation Agency (JICA), and produced, besides a master plan for the whole corridor, detailed land use plans (Plans d'urbanisme directeur de l'agglomération, PUDI) for each metropolitan area. It envisions the modernization of the national economy through the specialization of urban development in Toamasina in logistics, industrial and tourism activities, and the expansion of the industrial and tertiary sectors in the metropolitan area of Antananarivo beyond the city center.

Additionally, the AfDB completed a study in 2021, providing a long-term strategy for Antananarivo with a horizon up to 2040. The vision is based on the principles of sustainable urban development and further develops previous proposals for the decentralization of the city through the construction of new towns (*villes d'équilibre*) in the metropolitan periphery as a way to relieve the pressure of population and activities on the center of Antananarivo alongside building the necessary metropolitan transport infrastructure.

All these documents are aligned by the implementation of so-called presidential projects for the capital. The scope of these projects has changed along the time, and now include the development of a new town (Tanamasoandro) in the periphery of the capital (associated to the relocation of governmental offices), the completion of an orbital motorway, the construction of two cable car lines with an estimated cost of EUR 152 million, partly financed by French loans, additional road projects in the metropolitan area, within the already mentioned TaToM concept improving the road connection between the capital and Toamasina, and an urban train project, linking Ankorondrano with *Gare de l'Est* through Soarano rail station.

These presidential projects are also included in the most recent attempt of the MTM to address mobility challenges in the capital: the study *Schéma Directeur du Transport dans la ville d'Antananarivo* (SDT), presented in April 2022. The SDT intends to provide sustainable solutions to the mobility problems in the capital in order to sustain its urban and economic development, and to identify the investments in infrastructure and services that should be prioritized.

Urban policy in Toamasina

Toamasina is the second most populated city in Madagascar, and its main port. With an average annual population growth of 3.51% since 1993, the population reached 326,286 inhabitants in 2018, with a density of 10,525 inhabitants/km², leading to an increasing urbanization of the peripheral areas and municipalities around the city.

The local government of Toamasina considers that the current mobility conditions in the city generate accidents and pollution and that mobility services are expensive and uncomfortable for users. Significant investment in infrastructure and rolling stock is needed. As a first step, the municipality envisages the re-introduction of regular bus services and the reduction of the number of rickshaws and tuk-tuks. In addition, the city plans to improve road conditions along the main routes to be served by public transport, as well as stricter control of the operation of all vehicles with a particular attention to rickshaws and tuk-tuks.

Baseline scenario and policies for the transport sector

Transport policy has traditionally been set by the national government through national transport plans (*Plan National de Transport*, PNT). The last plans were set up in 2004 and 2013, but their level of implementation was low. Although the PNT-2013 included some general considerations on urban mobility, it did not include concrete actions, as this is the competence of municipalities. The focus of the PNT-2013 is the improvement of the interurban road network, and it does not include explicit objectives on climate change or the environment. The PEM (2019-2023) also focuses on the development of the road network as a key precondition for socioeconomic development and does not make explicit references to urban mobility or to the climate impacts of transport; it includes a list of priority projects including the construction of flyovers to fight congestion and to modernize the capital city, and the setting up of a GPS platform to track public transport vehicles as well as surveillance cameras at interurban bus terminals. It also calls for the recovery and expansion of the rail network,

including the metropolitan area of Antananarivo (*Grand Tana*). The government's priority to the improvement of the trunk road network has been supported by the WB through the Connectivity for Rural Livelihood Improvement Project (Projet d'Appui à la Connectivité des Transports, PACT), the Road Sector Sustainability Project (Projet de Développement Durable des Routes, PDDR), and the Connecting Madagascar for Inclusive Growth Program. with closing dates in March 2025, September 2027 and June 2028 respectively.

Currently, the MTM is preparing an Inland Transport Policy document (*Politique des Transports Terrestres, PTT*) with a 2024 horizon; It considers that the lack of action of the national government in urban mobility and the consideration of this subsector as the sole responsibility of the municipalities has resulted in growing accessibility, pollution and congestion problems, and it calls for more active action of the national government. However, the document does not identify concrete actions yet..

Since 2015, transport policy has focused on the facilitation of interurban road passenger transport, including the construction of bus terminals, with a Committee within the MoTM steering the process, and the approval of Decree 2017-1157 on the construction, management and operation of road passenger transport infrastructures.

Madagascar privatized the transportation services for passengers and goods in 1995. In the same year, the legal framework on land transport's organization and on passenger public transportation was adopted. In 1998, the country established the organizational standards for public transport, including urban and suburban services. In 2005, a new act on the principles of land transport policy was promulgated (*Loi 2004-053*, of 28 January 2005) and the Land Transport Agency (*Agence des Transports Terrestres, ATT*) was set up^{[21]²¹}. ATT is responsible, inter alia, of the update of public transport regulations and the supervision and control of public transport activities.

In accordance with the SDT and the recommendations from a recent World Bank's study^{[22]²²}, the MTM envisages three main lines of action in the urban transport sector: a comprehensive reform of the sector, in order to increase its professionalism, the restructuring of the public transport network in the capital and the implementation of a bus renewal programme. The MTM is currently working on two new Decrees: one on the circulation of motorized 2Ws on public roads and another on the development of the principles set up by Law 2004-053 in what refers to the organization of passenger and freight road transport. In this framework, the introduction of electric vehicles could be included within the future national or sectoral plans for climate change mitigation.

The consideration of the transport sector within climate change policies has been limited these far. The Nationally Appropriate Mitigation Actions (NAMA), identified in 2010, included the promotion of biofuels and the development of low-emission transport modes such as paratransit, rail-guided public transport systems and improvement of transport services in the metropolitan area of Antananarivo as a way to reduce GHG emissions, but they were not implemented. The PNLCC (2011) and the INDC (2015) did not include specific mitigation actions in the transport sector. The Third National Communication (NC-3), issued in 2017 included some transport-related measures, such as the

improvement of the efficiency of public transport services (with the use of buses with higher capacity), a strategy for the reduction of the average age of the vehicle fleet and the control of the vehicles? roadworthiness. The current PANLCC (2019) envisages the development of sustainable mobility for the reduction of GHG emissions and improvement of air quality in the metropolitan area of Antananarivo. However, no concrete decisions have been adopted yet to implement such actions.

Information on the vehicle fleet is incomplete. The annual reports of the National Statistics Agency (INSTAT) provide information on new registrations for Antananarivo, but without sufficient disaggregation by vehicle categories (Table 8). Such disaggregation is provided since 2017 in quarterly reports for Antananarivo and since 2020 for Toamasina (Table 7), but with some gaps. Another source of information is the Third National Communication (2017), which provides new vehicle registrations for the whole country in 2006 and 2010, and forecasts for 2015 and 2020 (which have not materialized); it also estimates that the average age of the vehicle fleet has increased from 8.8 years in 2006 to 9.9 years in 2015, and it estimated that it would attain 9.8 years in 2020; however, the average age is considering the vehicles as new at the time of their registration in Madagascar, even if they are second-hand vehicles imported from other countries. This data indicates strong growth in the number of new registrations (over 12% per year) between 2010 and 2015 which would continue (at a rate of 10% per year) until 2020. Registration data in Antananarivo shows that COVID has resulted in a strong reduction (-21.9%) in the number of annual registrations, presumably to be recovered in 2021 and 2022.

	2006	2010	2012	2015	2019	2020	2021
Madagascar (1)	11,527	14,221		25,276 (2)		40,708 (2)	
Antananarivo (3)			24,587	14,652	10,352	8,178	11,644
Toamasina (4)						1,885	2,342
(1) Source: Third National Communication (2017) (2) Forecasts (3) Values from annual INSTAT report. Values from INSTAT quarterly report are slightly different: 10,699 vehicles in 2019 and 8,361 vehicles in 2020. (4) Values from INSTAT quarterly report.							

Table 9: Annual vehicle registrations

Disaggregated figures by vehicle category for 2020 in Antananarivo and Toamasina show that the share of two and three wheelers (2&3W) in total vehicle registrations (there is no disaggregation among motorcycles and touk-touks) is much higher in Toamasina (34.6%) than in Antananarivo (16.7%), whereas the opposite occurs for the share of cars (42.6% of total registrations in Antananarivo and 22.3% in Toamasina).

	Antananarivo	Toamasina	% Antananarivo	% Toamasina
2&3W	1394	652	16,7%	34,6%
Car	3560	420	42,6%	22,3%
LDV	1411	292	16,9%	15,5%
PT	886	213	10,6%	11,3%
HDV	747	95	8,9%	5,0%
Other	363	214	4,3%	11,4%
Total	8361	1885	100,0%	100,0%

Table 10: New registrations by vehicle categories, 2020

The municipality of Toamasina provided an estimate of the total number of 3W registered between 2012 and 2020, resulting in 2,007 vehicles, of which just 921 (i.e., 46%) have renewed their registration in the municipality; the rest could have been retired from circulation, transferred to another region or could remain circulating informally. Of them, 156 were electric; since 2020 the number of electric 3Ws has increased, reaching approximately 240 vehicles.

The statistics do not provide separate figures for 2Ws and 3Ws or a distinction by the characteristics of the engine. However, it provides quarterly information on the distribution of sales by manufacturers. Based on this, it is possible to estimate that, in accordance with data for the last quarter of 2019 (prior to the COVID pandemic), 2-stroke scooters in Antananarivo accounted for 36% of total registrations (some 500 vehicles- 2&3 wheelers- in total, with 3 wheelers representing just above 1% of the registrations).

An estimate of traffic in Madagascar can be made based on gasoline and diesel consumption. This information has been provided by INSTAT for 2018-2021. It indicates that fuel consumption (and road traffic) followed a growing trend (+6.2% for gasoline, +2.0% for diesel) between 2018 and 2019, and fell significantly in 2020 as a result of COVID (-10.5% and -14.0%), to recover in 2021 (+10.8% and +22.6%).

All vehicles imported into Madagascar have to pay an import duty of between 59% and 118% of CIF (Cost, Insurance, Freight) value depending on whether the vehicle has been previously registered for more than one year or for less than one year respectively; there are no fiscal disincentives to the importation of old vehicles. Vehicle sale is also subject to VAT and to a registration tax.

Baseline scenario and policies for the energy sector

The electricity sector in Madagascar was reformed in 1998 (*Loi 98-032 sur l'électricité*), opening the market for electricity generation while keeping the monopoly of the state-owned utility, JIRAMA (*Jiro sy Rano Malagasy*) in the transmission and distribution of electricity. JIRAMA is also responsible for the provision of water services. The sector was subsequently reformed in 2017 (*Loi n° 2017-020, portant code de l'électricité*) and with the transformation of the former National Electricity Fund into a Sustainable Energy Fund (*Loi n° 2017-021*), in order to align the regulatory framework with the principles set up in the national energy policy (*Nouvelle Politique de l'énergie, NPE*), adopted in 2015, aiming, inter alia, at encouraging investment in renewable electricity generation. The key institutions in the energy sector, besides JIRAMA, are Ministry of Energy and Hydrocarbons (MEH), the National Fund for Sustainable Energy (FNED), the Energy Regulation Office (ORE), and the Rural Electrification Agency (ADER). The MEH is responsible for the design and implementation of the government's energy policy, the coordination of the energy sector and the oversight of JIRAMA's electricity generation, transmission and distribution activities. The Energy Regulation Office (ORE) oversees the operation of the electricity markets, oversees the negotiation of Independent Power Producer (IPP) tariffs, establishes electricity prices and monitors and enforces quality norms. The National Fund for Sustainable Energy (FNED) is a national fund developed to promote electricity access through renewable energy development and grid extension. The fund is partially financed from JIRAMA's and other power producers' revenue as well as from donations from other actors in the energy sector. The Rural Electrification Agency (ADER) oversees electrification of the Madagascar's rural areas through grid extension, off-grid and mini-grid systems.

The most recent information available on electricity generation in Madagascar (2017) estimates it at 1,970.5 GWh^[23]²³, of which 1,701.6 GWh (86.4%) is produced by JIRAMA, and the rest by other producers, connected or not to the grids^[24]²⁴. In 2017, electricity generation was dominated by fossil fuels (58% from heavy fuel oil, gasoil and coal), followed by hydroelectricity (40%) and biomass (Table 11, to compare with electricity generation by JIRAMA in Table 4).

	2017, GWh	Share of total production
Hydroelectricity	788.5	40%
Biomass	25.7	1%
Gasoil	513.4	26%
Heavy fuel	525.7	27%
Coal	117.2	6%

Total	1970.5	100%
Source: MEH (2019). Bilan énergétique national 2017		

Table 11: Total electricity generation in 2017 (all producers)

JIRAMA has slightly increased its generation in the last years (+5.6% in 2018, +3.5% in 2019, -1.3% in 2020 and +4.0% in 2021)^[25]²⁵. In 2018, JIRAMA opened its first solar farm in Ambohipihaonana, with an installed power of 20 MW, but INSTAT statistics do not include electricity generation other than thermal and hydraulic (Table 4).

Since 2004, the GoMG has been granting mini-grid concessions to private operators to electrify rural villages. At the end of 2021, the database of the MEH included 107 small renewable off-grid plants owned by companies other than JIRAMA, including 45 solar plants, 16 hydraulic plants and 9 diesel plants. The rest were hybrid plants, combining diesel with biomass (1), hydraulic (4), wind (1) or solar (25) generation, except for one hybrid plant combining solar and wind, and another one combining diesel, wind and solar generation and 4 without information. The total power of these plants was 9.35 MW. JIRAMA owns and operates about 130 isolated mini-grids.

The electricity system suffers from pervasive structural problems, such as the high electricity generation costs, and the relatively low JIRAMA's cost recovery rate, which fell to just 34% in 2017 although it has slightly recovered afterwards. Although JIRAMA periodically gets transfers from the GoMG, they are not sufficient to compensate financial loss, leaving the utility unable to undertake the necessary investments in the grid. Furthermore, the electricity generated by private companies is also coming from small and inefficient thermal plants and the contracts between JIRAMA and these providers are onerous for the public utility, to compensate the high risk perceived by investors^[26]²⁶. The challenges were already properly identified at the turn of the century, but have not been properly addressed yet, partly due to the political instability in the country. There are only three integrated networks, covering the urban centers of Antananarivo, Toamasina, and Fianarantsoa, all of them operated by JIRAMA.

The estimated national electricity access rate in 2016 was 22.9%^[27]²⁷ (57.59% in urban and peri-urban areas and 6.10% in rural areas) but it has increased to 33.7% in 2020, in accordance with WB data. Although the GoMG stated in its 2015 National Energy Policy (NPE) its goal to increase energy access to 70% by 2030 (with 85% of the energy mix supplied by renewable energy), there is no evidence of substantial progress thus far, due to a combination of barriers: JIRAMA has not the resources necessary to significantly increase the number of connections, the income of most of the potential customers in the underserved areas (urban and rural) is low, and their consumption would not compensate the investments in the distribution grid or in off-grid systems (OGS) that JIRAMA (or private operators) would need to cover; the tariffs established by ORE (0.150 USD/kWh for households and 0.099 USD/kWh for businesses^[28]²⁸) are not covering electricity production costs and JIRAMA's collection

rate remains low (see above), so that any increase in the number of customers would result in even higher losses.

In 2015, the GoMG set up in the NPE a strategy for the energy sector, which remains largely valid in spite of its poor level of implementation. Its development has been supported by the WB and the AfDB through different projects, some of which remain under implementation or waiting for final approval (Table 12).

Project	Time-frame	Comments
AfDB. Projet de renforcement et d'interconnexion des réseaux de transport d'énergie électrique ? Madagascar. (PRIRTEM)	PPF request in 2017	Interconnecting the country's three major power grids (Antananarivo, Toamasina, Fianarantsoa)
AfDB. Projet de renforcement et d'interconnexion des réseaux de transport d'énergie électrique ? Madagascar. Phase I (PRIRTEM I)	Project appraisal completed in 2019. 4 years for implementation.	Interconnecting the power grids of Antananarivo and Toamasina. EUR 203 million; blending financing not wholly set up yet ^[29] .
AfDB. Projet de renforcement et d'interconnexion des réseaux de transport d'énergie électrique ? Madagascar. Phase II (PRIRTEM II)	2021-2025	UA ^[30] ³⁰ 30 million. The new 220 kV line between Antananarivo and Antsirabe will allow the integration of the renewable energy that will be produced notably by the Sahofika hydropower plan
WB. Least-Cost Electricity Access Development Project (LEAD)	2019-2024	On-going, although at a disbursement rate notably lower than planned
WB. Electricity Sector Operations and Governance Improvement Project (ESOGIP)	2016-2023	The preparation of this project helped to support the preparation of the National Electrification Strategy 2015-2030

Table 12: Energy generation projects financed by AfDB and WB

The Government of Madagascar's (GoMG) electrification strategy^[31]³¹ aims to raise electrification to at least 70 % by 2030 through both grid and off-grid solutions. In line with the NPE, a National Electrification Strategy (NES 2015-2030) was subsequently approved, confirming a strong emphasis in the expansion of off-grid electrification technologies and defining in more detail the key technical,

financial, and institutional parameters of the GoMG's electrification approach. In 2030, 70% of the electricity would be provided via the extended interconnected grid (with a generation mix composed of 75% hydroelectricity, 15% thermal, 5% wind and 5% solar); 20% would be provided via mini grids (with a generation mix of 50% hydroelectricity, 20% biogas from rice stalk, 25% diesel and 5% solar) and the remaining 5 % from off-grid solar systems. The NPE intended to make the best of the significant resources of the country in renewable energy, estimated at 7,800 MW for hydroelectric, 2,000 MW for wind and some 2,000 kWh/m²/year for solar. Some projects are already underway, as presented in the table below.

Project	Completion date	Power	Budget (million)
Mahitsy hydroelectric plant	2021[32] ³²	28 MW	MGA 450,000
Adekaleka hydroelectric plant (4th group)	2022[33] ³³	33.2 MW	EUR 24.5
Sahofika hydroelectric plant (phase I)	2026	192 MW	USD 895
Volobe II hydroelectric plant	2025	121 MW	USD 372
Mandraka III hydroelectric plant	NA[34] ³⁴	5 MW	EUR 47
Green Yellow solar plant (extension)	2022[35] ³⁵	20 MW	EUR 17
Source: MEH			

Table 13: Electricity generation projects under implementation

There is also a list of 15 additional hydroelectric plants as 'candidate projects' and several solar farms, some of them connected to the existing integrated grids and others off-grid, as well as one incineration plant in Analamanga, with a power of 55 MW. The projects for rural electrification would provide a power of 236 MW by 2030, of which 137 MW from hydroelectric mini-grids, 41 MW from solar mini-grids and 44 MW from Solar Home Systems (SHS).

Climate change policies

Madagascar has ratified the UN Framework Convention on Climate Change (UNFCCC, 1998), the Kyoto Protocol (2003) and the Paris Agreement (2016). These international commitments are integrated within the current national strategies, i.e. the *Initiative de l'Emergence de Madagascar*

(IEM, 2019-2023, presented in 2018 during the presidential elections), and the *Politique G n rale de l' tat* (PGE, 2019-2023, presented in 2019). The IEM needed to be formalized as a full-fledged plan, but its preparation was delayed by the COVID pandemic and the preparation of the plan was retaken with a launching event in October 2022, under the name of *Plan Emergence Madagascar (PEM)*, although the process has not concluded yet .

These international commitments have been further developed through different documents: the *Politique Nationale de lutte contre le changement climatique* (PNLCC, approved in 2011), the National Communications to the UNFCCC (submitted in 2004, 2010 and 2017), the Intended Nationally Determined Contributions (INDC, submitted in 2017) and the *Plan d'Actions Nationales de lutte contre le changement climatique* (PANLCC, approved in 2019). There are also specific policies and plans completed or under preparation in different sectors, such as the *Strat gie Nationale de la R duction des Emissions issues de la D forestation et de la D gradation foresti re* (REDD+). The country is currently preparing its Nationally Determined Contributions (NDC) and its first Biennial Update Report (BUR), as well as a Long-term Low-carbon Development Strategy with a 2050 horizon.

Some Nationally Appropriate Mitigation Actions (NAMA) were identified in 2010. They included the development of off-grid systems (OGS) based on renewable energy (hydroelectric micro-plants, wind, photovoltaic and biomass), the promotion of biofuels and the development of low-emission transport modes such as paratransit, rail-guided public transport systems and improvement of transport services in the metropolitan area of Antananarivo as a way to reduce GHG emissions and improve air quality. At the time of preparation of the PNLCC (2011), a *Strategie nationale du mecanisme de developpement propre a Madagascar* was also prepared, with actions regarding renewable energies biofuels and energy efficiency.

The PNLCC (2011) identified some actions in the energy sector (which included the transport sector, although no specific actions on transport were established), and announced the preparation of guidelines for the integration of climate change within all the relevant sectoral policies.

Madagascar submitted its third National Communication (NC-3) to the UNFCCC in 2017 (NC-3). The document provides GHG inventories for 2005 and 2010 and states that, although Madagascar remains a GHG sink in 2010, this GHG sink capacity has drastically decreased, going from 131,865 Gg CO_{2eq} in 2005 to 68,422 Gg CO_{2eq} in 2010. This results from the drop in absorptions of 280,254 Gg CO_{2eq} in 2005 to 220,094 Gg CO_{2eq} in 2010. The emissions remained almost stable between 2005 and 2010, varying from 148,389 Gg CO_{2eq} in 2005 to 151,672 Gg CO_{2eq} in 2010. The energy sector (including transport) represented just 2.0% of emissions (including LULUCF) in 2010, slightly higher than in 2005 (1.7%). The contribution of transport to emissions in the energy sector decreased between 2005 and 2010, from 36.5% to 25.1%, as transport emissions grew annually just by 0.3% in that period (reaching 990 Gg CO_{2eq} in 2010), compared to an annual growth of 2.9% in the energy sector.

The mitigation section of the NC-3 builds upon the Intended Nationally Determined Contributions, that Madagascar has submitted in 2015 (INDC-2015). The INDC included mitigation measures, such as the deployment of renewables, but did not include any action in the transport subsector. The BAU scenarios for 2020 and 2030 are similar in both documents, but the emission reduction contribution set up in the INDC for 2030 was more ambitious: 14% for emission reduction compared to the BAU

scenario (compared to just 8% in NC-3) and an increase of the absorption capacity by 32 % (compared to just 20% in NC-3).

Under the BAU scenario in NC-3, Madagascar would no longer be a sink in 2030, and net emissions would attain 22,290 Gg CO₂e, with the energy sector jumping from 2,992 Gg CO₂e in 2010 to 12,961 Gg CO₂e in 2030. The implementation of the mitigation measures foreseen in NC-3 would provide emission savings of 42,704 Gg CO₂e by 2020 and 56,524 Gg by 2030 through a reduction of emissions of 5% by 2020 and 8% by 2030 and an increase of the absorption capacity of 15% in 2020 and 20% in 2030. The mitigation measures proposed in the energy sector would provide 11% (770 Gg Co₂e) of the 2020 savings and 12% (1,527 Gg CO₂e) of the 2030 savings. Most of these savings (92% in 2020 and 89% in 2030) are due to the construction of major hydroelectric plants, but there are other measures envisaged, such as the deployment of renewables, the introduction of biofuels, the improvement of the efficiency of public transport services (with the use of buses with higher capacity), a strategy for the reduction of the average age of the vehicle fleet and the control of the vehicles' roadworthiness.

The PANLCC (2019) provides actions with a 10-year horizon and with a mid-term (i.e. 2024) revision. It aligns the former plan (PNLCC 2011) with the national vision stated by the IEM and the PGE. Actions are organized in 12 programmes, including 'strengthening the deployment of renewable energy and electrification' and the 'development of sustainable mobility for the reduction of GHG emissions and improvement of air quality in the metropolitan area of Antananarivo (*Grand Tana*)'. It was accompanied by a technical document providing climate scenarios for 2030, 2050 and 2080. The MEDD is currently updating the contents of the PNLCC and its Nationally Determined Contribution (NDC)^[36]. One of the barriers identified in the PNLCC for its implementation is the lack of sufficient recognition within the legislation; another one is the high level of poverty.

Based on the PANLCC (2019), the GoMG prepared in 2021 sectoral strategies on climate change for three sectors: water, waste and industry. Similar strategies are under preparation for two additional sectors: energy (including transport) and agriculture.

The implementation of the country's commitments linked to the UNFCCC is under the responsibility of the National Office for Climate Change and REDD+^[37] (*Bureau National sur le changement climatique et le REDD+, BNCCREDD+*) The integration of climate change and other environmental objectives within sectoral policies has been supported by two inter-ministerial coordination bodies: the National Committee on Climate Change (*Comit? National sur le Changement Climatique, CNCC*) and the Inter-Ministerial Committee on Environment (*Comit? Interministeriel sur l'environnement, CIME*). The CNCC and the CIME were established respectively in 2014 (D?cret 2014-1588) and in 1997 (D?cret 97-283). After a period of scarce activity, the CIME was revitalized in 2017 (D?cret 2017-1106). Whereas the CNCC is chaired by the MEDD, the CIME is chaired by the President's Office. This is consistent with their different political roles: the CNCC focused on steering and monitoring the national climate change policy, whereas the CIME is focused on the integration of environmental objectives within the broad political guidelines and priorities of the government, and speeding up the implementation of prioritized government's actions, solving eventual controversies

among ministries. In this sense, the CNCC seems the appropriate body to oversee the implementation of a national policy of electro-mobility, and the project envisages to establish a subcommittee under CNCC to this end..

The National Environmental Policy (*Politique Nationale de l'Environnement pour le Développement Durable, PNEDD*, approved by *Dcret 2015-1308*) does not make specific references to climate change, but it calls for the integration of the environmental objectives in all sectors, and the search for synergies, as well as for the preservation of the environment and the effective involvement of the population, with a particular attention to women, youth and other vulnerable groups.

The management of electric and electronic waste was regulated in 2015 (*Dcret 2015-930 portant classification et gestion écologiquement rationnelle des déchets d'équipements électroniques et électriques ? Madagascar*), and the management of products at their end of life was regulated in 2012 (*Dcret 2012-754*). They follow the framework established by the Basel Convention and, jointly, they provide the legal framework that could be applied to the management of end-of-life electric vehicles and their batteries. Although the necessary secondary legislation has not been fully established yet, these pieces of legislation provide some valuable points: a National Office is established (*Bureau National de la Convention de B?le*, BNCB) under the MEDD, the responsibility of the producers with regards to waste management is clearly established and a financing programme is created, with resources allocated through an additional charge at the purchase of the products included in the legislation. The BNCB is the relevant body to authorize the companies that will be authorized to undertake e-waste management activities. Furthermore, a national plan on e-waste management is envisaged, although it has not been prepared yet.

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

The objective of this project is to lay the ground for the successful introduction of electric mobility in Madagascar. This comprises building the necessary administrative structures, the development of capacities among key decision makers, and the provision of a coherent strategy. As part of the project, an e-mobility subcommittee coordinating the relevant policies of the Ministry of Transportation and Meteorology (MTM), the Ministry of Environment and Sustainable Development (MEDD), the Ministry of Energy and Hydrocarbons (MEH) and the Ministry of Economy and Finance (MEF) will be established within the National Committee on Climate Change (CNCC). The subcommittee will ensure that all relevant stakeholders approach the introduction of e-mobility in a coordinated and cooperative manner and that local governments and the private sector will be able to participate as observers, so that the subcommittee will act as a focal point for interaction with the government, providing information on e-mobility regulation and policy and supporting the local private sector in setting up e-mobility businesses. The development of the national e-mobility strategy will build upon 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 vehicles in the public transport and government fleets, starting with demonstrations on the use of two and three wheelers (2&3Ws). Electric 2&3Ws are a low-cost measure to mitigate CO2 emissions and to reduce energy use, air pollution and their associated costs and negative impact on health in Madagascar.

The project's strategy combines a focus on electric drive technologies and electric mobility (CCM-1-2), with the urban mobility strategies under development by the GoMG and the municipalities of Antananarivo and Toamasina, which aim at the improvement of the quality of public transport while maintaining the services affordable for a majority of the population. Urban mobility challenges in Madagascar have been extensively analysed in the last years^{[38]³⁸}, including the low quality and financial stress of public transport services and the growing levels of traffic congestion and road accidents in spite of low motorization rates, accelerated by the use of motorcycles and other cheap transport means by untrained drivers for their own use or to provide informal services.

The Theory of Change (ToC Figure 6) provides the project's strategy, addressing the four barriers identified in the problem tree described in the previous section and taking into consideration the policies in progress and the challenging socio-economic context in Madagascar in the aftermath of the COVID crisis. The project's strategy (i) addresses current institutional weakness through a combined approach in which the formalization of the e-mobility policy within the public administration (top-down) is strengthened by building capacities among all the relevant stakeholders and establishing a consistent stakeholder engagement strategy (bottom-up) for the promotion of sustainable low-emission transport systems. The approach fosters women's participation in policymaking processes and intends to expand the share of women at decision-making positions. This approach is consistent with the conclusions of the urban mobility studies mentioned above in creating the enabling conditions for the provision of efficient gender-responsive low-carbon urban mobility services.

The project strategy (ii) addresses the current practices in urban transport operations, which are hampering urban mobility innovations (and particularly electrification). It adopts a 3-stage approach, which starts by strengthening the urban transport planning framework providing recommendations to improve PT operations in Antananarivo and Toamasina based on the implementation of a trunk & feeder PT concept. Building upon the implementation of these recommendations, the project will provide tailored roadmaps to each city for the electrification of their PT fleets. Finally, the project will design and implement demonstrations on the operation of EV fleets (3Ws in Toamasina and 2Ws in Antananarivo). These demonstrations intend to provide short-term results and to regain the interest of investors and decision-makers in electric mobility and the urban mobility sector. The project builds upon the lessons learnt and experience gained by some early adopters, which have already introduced more than 200 electric 3Ws in Toamasina, although with modest performance in terms of speed, power and autonomy. In Antananarivo, the project will support the partial electrification of the 2W fleets of the local (communal) police and one major private corporation (to be identified during project implementation), as a way to provide a good practice reference and to create awareness among fleet

managers and to the growing number of 2W users. This is supported by professional training on driving, maintenance and assembly of electric 2&3Ws. While implementing this approach, the project strategy will make specific attention to the opportunities it can offer to women and other vulnerable social groups, and to their specific mobility needs.

The project strategy (iii) addresses current market barriers through the development of an enabling framework, including fiscal and regulatory reforms, financing schemes and business models, as well as the completion of the project's communication plan to raise awareness and gain support from key stakeholders and the general public, and to facilitate the networking of a variety of stakeholders to work together on transport improvements and EV commercial opportunities. Relevant stakeholders to mobilize in such network include vehicle dealers and the local vehicle industry, fleet managers (including public transport operators) and local financial and insurance institutions. This bottom-up approach is expected to expand the impact of the project's demonstrations, to support the effective implementation of the national e-mobility strategy and to accelerate the design and implementation of feasible financial mechanisms to support the acquisition of electric vehicles by fleet operators.

Finally, the project strategy addresses (iv) the new environmental challenges raised by electrification in the transport sector, such as the additional recycling and waste management needs raised by the new equipment (most notably lithium batteries and charging devices) and the potential impacts and synergies of off-grid electricity generation systems. These environmental challenges are considered within the broader framework of management of e-waste, (1) providing the development and update of the current legal framework on e-waste management in accordance with good international practice, so that it can foster a reliable e-waste collection and management system, (2) building up the necessary capacities through professional training and the selection of at least one company to develop some initial activities to collect, re-use and recycle e-waste, including used e-mobility batteries, and (3) providing a strategy on how to link the upscaling of renewable power generation, including through micro and mini-grid applications in Madagascar. The latter will specifically look into the possible synergies of the use of electric motorcycles and the plans to increase the rate of electrification in the rural parts of the country.

The project's strategy is summarized in Figure 9. The project provides guidelines and strategy targeting the government and other key stakeholders (outcome 1), demonstrations involving two cities (outcome 2), upscaling (outcome 3) to reach out to fleet managers, bus operators and industrial and professional activities that can benefit from the introduction of electric vehicles in Madagascar, while addressing the new environmental challenges raised by EVs (component 4). The up-scaling effort is expected to result in mainstreaming good fleet management practices, the procurement and use of electric vehicles as the preferred option for users, the development of efficient public transport networks in cities and the continuation and consolidation of environmentally friendly mobility policies and regulatory reforms. The project's strategy includes the mobilization of civil society organizations and especially those supporting gender equality, throughout the project's lifespan, and supported by the engagement, consultation and communication plan. This will also facilitate the effective integration of gender dimensions in the project.

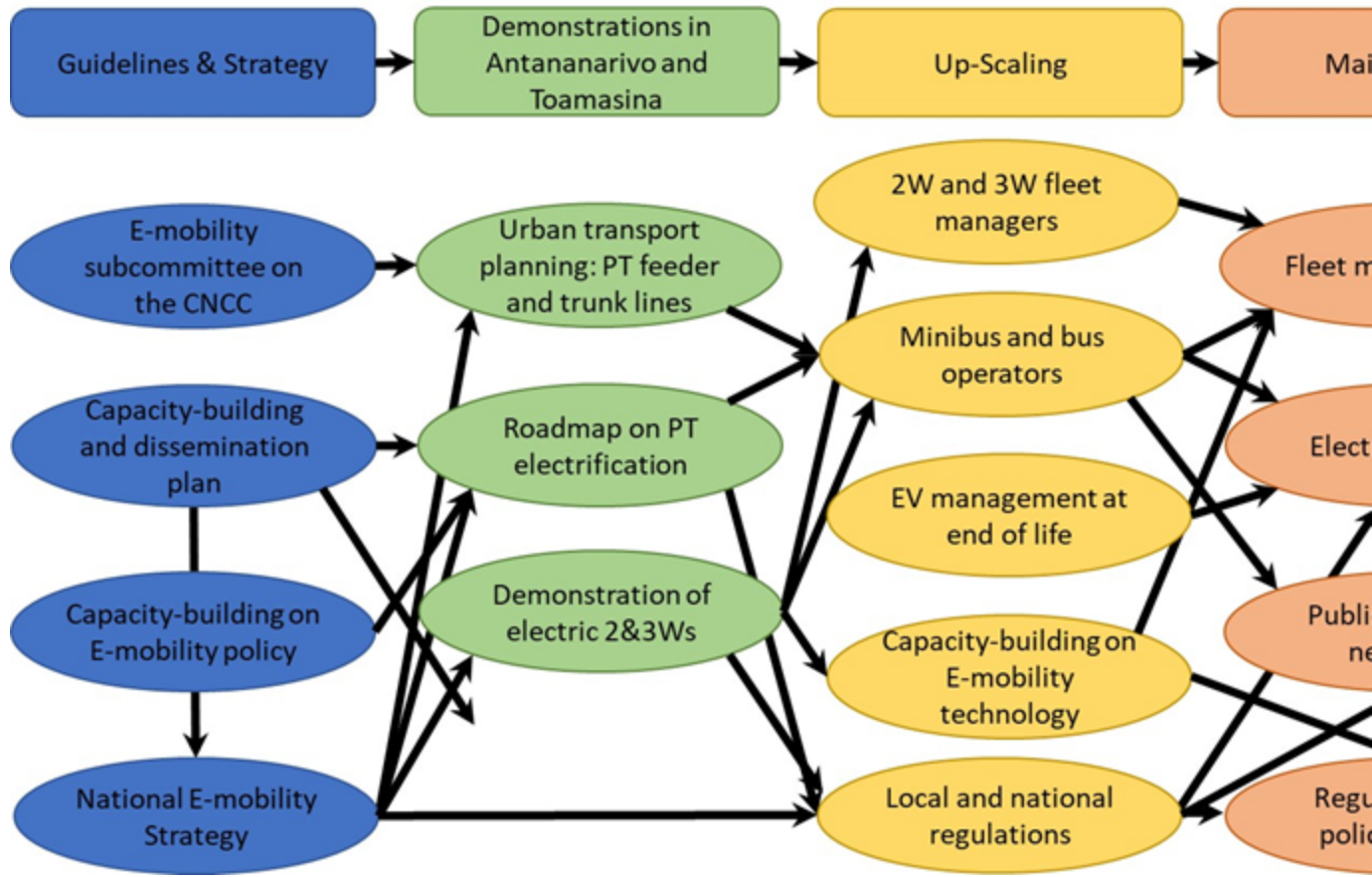


Figure 3: Project mainstreaming strategy

The project aligns its sustainability and exit strategy with the EV market transition design provided by UNEP's global e-mobility programme (Figure 4). It is a first step towards mainstreaming of EVs making them competitive in all market segments, while embedding the effort within the national and local governments' actions to improve and expand the public transport system and to modernize the country's fleet.

EV market transition in low and middle income countries

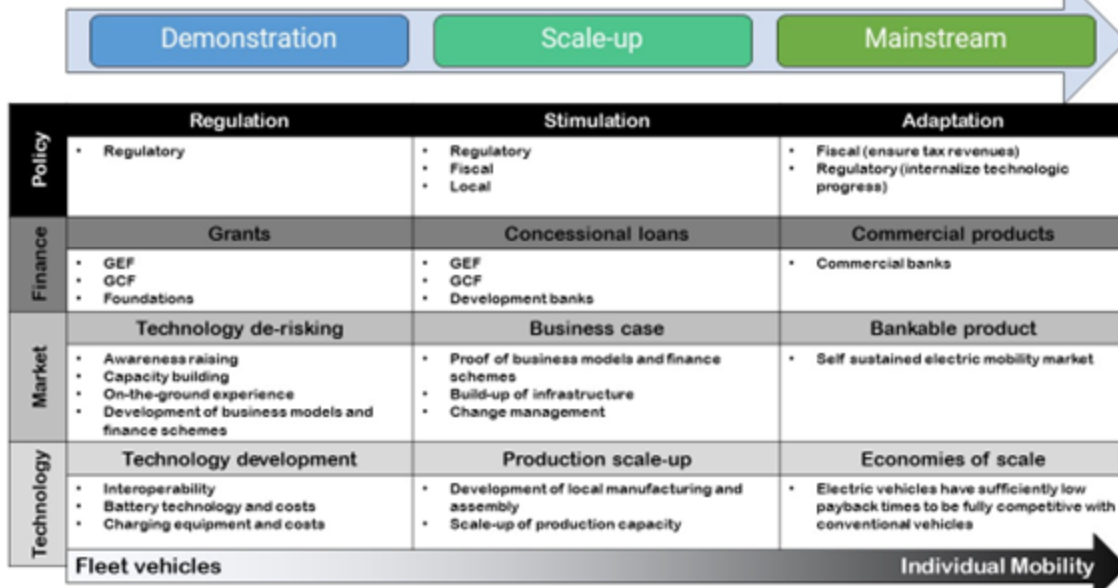


Figure 4: E-mobility strategy (Source: UNEP, Global E-Mobility Programme Framework Document)

The main expected result of the project is the reduction of GHG emissions, and the improvement of urban mobility based on sustainable modes, contributing to improving mobility conditions of the population (including vulnerable social groups) and supporting public transport (PT) operators and other fleet managers to make better use of their fleets with lower environmental footprints.

The project's leading partner within the government is the Ministry of Environment and Sustainable Development (MEDD), through its Climate Change Office (*Bureau National des Changements Climatiques, du Carbone et de la Réduction des Emissions dues à la Déforestation et Dégradation des Forêts BNCCREDD+*). The project will therefore be closely associated to the climate change mitigation policy of the GoMG. Another key partner is the Ministry of Transport and Meteorology (MTM), which is responsible of the national transport policy, including the regulatory framework for urban mobility. As responsible for vehicle registration, MTM plays a role in any national fleet renewal process fostering electrification. The project's strategy strongly relies on the government's energy policies, under the responsibility of the Ministry of Energy Hydrocarbons, (MEH), as such policies are crucial in the adaptation of the electricity system to cope with future EV charging needs. MEH is the key institutional stakeholder in the blended finance scheme that will significantly expand electricity generation and interconnect the regions of Antananarivo and Toamasina, a basis for mainstreaming e-mobility.

As a means to achieve that result, the project foresees to empower the government and key stakeholders (such as public transport operators and car fleet managers), as well as CSOs that are actively engaged in environmental and mobility issues such as the National Women's Council (*Conseil National de Femmes de Madagascar, CNFM*) to adopt or promote gender-responsive sustainable

mobility practices and to foster universal accessibility, besides transitioning towards electrification. This will be sustained through participation of the working groups envisaged in the project's governance and the implementation of the engagement, consultation and communication plan, which envisages the adoption of participatory co-design practices in the preparation of the demonstration and the support of social, gender and environmental expertise in key project activities. The CNFM will also participate as a member of the Project Steering Committee (PSC).

The project intends to achieve these results through four components delivering outcomes that address the institutional, technical and cultural, market and environmental barriers mentioned in the previous section, and one additional component providing project monitoring:

Component 1: Institutionalization of low-carbon electric mobility

This component addresses the institutional barrier, providing a strengthened environment to support the promotion of sustainable transport systems with a focus on electric technologies. The project expects to build strong cooperation within the national and local governments and with civil society organizations through a newly established E-Mobility subcommittee within the National Committee on Climate Change (CNCC). As part of this component, a national strategy on e-mobility will be developed to define targets and milestones as well as policy and financial requirements for the use of electric vehicle among various modes and sectors. Finally, decision makers from government and private sector will be trained on issues of e-mobility.

This component benefits from in-kind co-financing contributions from MEDD, MTM and MEH in their respective areas of competence to strengthen the institutional framework in the implementation of the mitigation measures foreseen in the PANLCC, the update of public transport regulations and the expansion of electricity generation from renewables.

The enhanced institutional environment will facilitate the implementation of top-down initiatives to inform the national government's future policy (enshrined in the national e-mobility strategy), whereas the participatory approach in this component will empower key private and public stakeholders (such as public transport operators, municipalities and institutions and companies managing large vehicle fleets) to adopt innovative mobility practices on a voluntary basis. Relevant stakeholders from government, private sector, civil society and academy will be trained on e-mobility through the events carried out under the Africa Support and Investment Platform and other initiatives of the Global Electric Mobility Programme.

Outcome 1: The government establishes an institutional framework and adopts a strategy for the promotion of low-carbon electric mobility

Outputs:

? *Output 1.1: An inter-sectoral subcommittee on electric mobility is established within the National Committee on Climate Change (CNCC).*

This output contributes to improve the level of institutional coordination among transport, energy, environmental and climate change policies within the government. The new subcommittee is initially established as a working group reporting to the Project Steering Committee; the mandate, composition and terms of reference of the working group will be prepared by the Chief Technical Advisor (CTA) with UNEP's support. The working group is expected to be subsequently formalized as a subcommittee of the National committee on climate change (CNCC) by the mid-term of the project's lifespan, through a GoMG's resolution establishing its mandate and composition. It will monitor and supervise the preparation of the National E-Mobility Strategy and will coordinate the Strategy's actions to be implemented by the different stakeholders; in particular, it will seek for consistency among the government's policies on transportation, energy, sound environmental management (including e-waste) and climate change. After approval by the working group, the draft national e-mobility strategy will be submitted to the government for official approval. At the request of the PSC, the working group could also provide advice and support to the implementation of the other project's components.

The working group is expected to engage all the governmental departments with direct or indirect competencies in e-mobility (such as MEDD, MTM, MEH and MEF), and to invite as observers the municipalities of Antananarivo and Toamasina and other local governments as well as international donors (such as WB, AfDB, EU, AFD), the private sector (associations of vehicle (minibuses, cars, 2&3Ws) dealers, transport operators and workers), experts (Universities of Antananarivo and Toamasina) and civil society (e.g. CNFM). Once the working group is established as a CNCC's subcommittee, it will need to establish a stakeholder engagement plan to facilitate the active participation of entities outside the GoMG and to encourage networking and knowledge-sharing among those interested in e-mobility and will establish the participatory channels, consistent with knowledge management and training activities of the project (output 1.3). Detailed draft terms of reference and a workplan for the operation of the working group and the future subcommittee after project completion will be submitted by the CTA to the GoMG for adoption. The working group or subcommittee will meet every three months with a focus on facilitating awareness-raising in the country, and the implementation of the National E-Mobility Strategy; it will also supervise management and dissemination of the knowledge produced during the project (output 1.3).

This output includes the deliverables presented in the table below.

#	Deliverable Description
1.1.1	Draft Terms of Reference and Workplan for the national e-mobility subcommittee, with identification of operating modalities and all participating ministries and public and private stakeholders
1.1.2	Quarterly e-mobility subcommittee meetings are carried out (one report prepared per meeting, with gender disaggregated attendance sheet)

1.1.3	The national e-mobility subcommittee approves its stakeholder engagement plan (with a gendered approach), including an advisory consultation network open to wide participation
1.1.4	The national e-mobility subcommittee is established by an official decision of the national government within the CNCC
1.1.5	A workplan for the sustainable operation of the subcommittee after project completion is adopted??

Table 14: Deliverables included in output 1.1

? *Output 1.2: A national gender-sensitive electric mobility strategy is developed and submitted to the government for approval.*

This output intends to address the current gap in the government's plans in what refers to electric mobility. The strategy will provide the framework for the action of the government, the public and the private sector and the individuals until 2040, so that all stakeholders can take their decisions concerning e-mobility with a reasonable confidence about the future environment. It will also serve as a valuable support to the implementation of the PANLCC approved in 2019. The national strategy will integrate the priorities established in the government's plans, such as the 2018 IME, the 2013 National Transportation Plan and the 2015 New Energy Policy (NPE), so that the introduction of EV is consistent with the expansion of renewable electricity availability and with the improvement of public transport services. This will be complemented by a detailed study on the current characteristics and renewal patterns of the national fleet, including its operation and use from a gender perspective and the options to establish a reliable public charging network (including through fixed charging and through battery-swapping systems), consistent with the country's plans on renewable electricity generation and provision. Based on these technical studies and the contributions from relevant stakeholders (through the e-mobility subcommittee and the project's engagement and consultation channels), the National E-Mobility Strategy will establish feasible scenarios for electrification of the different vehicle categories and segments, including in these scenarios reasonable assumptions (validated with local gender experts and policy makers) on the expected trends in women's mobility, motorization and share of jobs in the transport sector. Finally, the National E-Mobility Strategy will provide a long-term vision of the role of EVs in a low carbon energy sector, their contribution to gain resiliency in combination with decentralized renewable energy generation. Besides the relevant governmental departments, this output will mobilize a wide variety of public and private stakeholders (electricity providers and professionals, car-dealers and maintenance professionals, fleet managers, financial sector), as well as political stakeholders, civil society associations and the public within a collaborative policy design approach following the guidance of the engagement plan (output 1.1). As a gender-sensitive policy document, the strategy will make the most of the opportunities offered by electrification to facilitate safe, convenient, and affordable women's mobility in Madagascar and to support the access of women to the new employment and entrepreneurial opportunities offered by electric vehicle technology. The national e-mobility strategy will follow an approval process requiring the coordination of the ministries involved (MEDD, MTM, MEH, MEF) to prepare the final document with the project's support and to

submit it to the Cabinet of Ministers for adoption. The public electric utility, JIRAMA[39]³⁹ is expected to play a key role in the preparation of the strategy, as the main electricity generator and only distributor in Madagascar. The expected deliverables to be prepared within this output are presented in the table below.

#	Deliverable Description
1.2.1	Detailed fleet data is collected and gender-sensitive scenarios for fleet electrification are developed and assessed.
1.2.2	Charging infrastructure needs are assessed, consistent with the preferred electrification scenario, and a network scheme, including off-grid renewable electricity generation options, is proposed.
1.2.3	A draft of a gender-sensitive national e-mobility strategy is completed, circulated for stakeholder consultation and validated at a workshop.
1.2.4	The revised gender-sensitive national e-mobility strategy is submitted to the government for adoption.

Table 15: Deliverables included in output 1.2

? *Output 1.3: A knowledge management and capacity building plan on electric mobility is prepared, and key stakeholders from public and private sectors are trained through national and Global Programme activities.*

Through this output, key public and private stakeholders in Madagascar will gain awareness of international best practices and know-how related to sustainable e-mobility policies. The training and awareness-raising approach will be established in detail within the knowledge management guidelines and the, capacity building plan to be prepared with the support of external consultancy, and will include (1) the preparation of training materials by experts, (2) the conduction of training activities in Madagascar, focusing on future trainers and influential individuals in the relevant sectors, (3) participation in the training and networking activities of the global programme and (4) wide dissemination and public access to the project's training and technical materials.

- (1) The preparation of training materials will be provided in output 3.3, delivered by the experts which will provide technical support for the preparation of the national e-mobility strategy; it will include the selection and adaptation of key international technical materials on this subject. The

development of training materials will be based on the materials provided by the Global Programme, for example through the Global Electric Mobility Toolbox (<https://emobility.tools/>)

- (2) Training activities in Madagascar will provide the initial capacity-building needs on e-mobility to make sure that key governmental officials and influential decision-makers in the public and private sectors are familiar with the basic technical and legal aspects of e-mobility. 2 training workshops are foreseen, each one with 10 participants: this relatively small figure is adequate to attract participants with a high decisional level in the public and private sector and increase their interaction with the project. Furthermore, the reduced number of participants will allow closer interaction among them, better tailored training dynamics and networking, which will be useful for the subsequent implementation of other activities in this component. Additionally, this relatively small number of participants is also consistent with the dimension of the country's government and economy. In the event that there is not sufficient participation in the 2 first trainings, the project could consider organizing a third one with the missing participants, Training will enhance the participants' ability to supervise and monitor the activities envisaged in the other project components and to assure the sustainability of the e-mobility strategy beyond project completion. These training workshops will follow a train-the-trainers approach to maximize impact and will address human capital development as well as organizational and institutional aspects (additional professional and technical e-mobility training activities targeting a wider audience of jobseekers and employees in the transport sector is provided for in component 2: see output 2.3).
- (3) Exposure to international best practices is assured by the participation of Malagasy experts in the capacity-building activities organized within the Global E-mobility Program. Influential individuals / decision makers from the public and/or private sectors with an ability to disseminate and share their experiences will participate in the different trainings / workshops / events organized by the Global E-mobility Programme and its African Support and Investment Platform. Dedicated budget has been provisioned to cover the costs of 18 trips / missions (i.e. flight ticket, visa, DSA, etc.) to participate in different events. UNEP, the Executing Agency for the Global E-mobility project and Lead of the Africa Regional Support and Investment Platform will notify the Project Management Unit (PMU) whenever regional training, workshops or events are planned, and the PMU will consult with the e-mobility subcommittee to select the national stakeholders participating at each event. The project will also make use of the E-mobility workplace and other services provided by the Global E-mobility Programme, through which contacts with global technology providers and original equipment manufacturers will be facilitated. Although sub-regional activities have not been considered within the regional platform, Madagascar will explore the possibility of partnering with participating countries in East Africa, like Burundi, Kenya and Rwanda. Training activities at the national level will benefit from the contributions of the Malagasy participants in the global and regional events. In order to increase the impact of the activities of the Global E-mobility Programme in Madagascar, the project team will use the materials and know-how generated in these activities to prepare recommendations for Madagascar, with a focus on the prospects for replication, based on the results of the EV Global Programme replication event.

- (4) This output will facilitate the management and dissemination of the knowledge produced during the project (studies, workshop conclusions, online workshops recording the training activities of the project and the Global Programme, data collection and analysis, training materials, interaction with the global project) through a national website (see component 3) under the supervision of the e-mobility subcommittee. Based on the results of the various training activities, the CTA will develop recommendations to be discussed at the national e-mobility subcommittee and subsequently submitted to the GoMG, and published in the project's website; additionally, the CTA will reach out to universities and other local educational institutions to offer the training materials as a basis to establish a permanent component on e-mobility within their technical curricula. The activities conducted within this output are presented in the table below.

#	Deliverable Description
1.3.1	Knowledge management plan is developed with expert's support and implemented by CTA
1.3.2	A capacity-building plan on e-mobility is prepared
1.3.3	Training materials on policy aspects of e-mobility for decision-makers
1.3.4	Training materials on technical aspects of e-mobility (including driving, maintenance, EVs? assembly, charging infrastructure)
1.3.5	Key Malagasy stakeholders participate in the trainings on electric 2-3 wheelers and buses organized by the Africa Support and Investment Platform of the Global E-mobility Programme (report to be prepared after each training)
1.3.6	Key Malagasy stakeholders participate in the market-place and financing workshops organized by the Africa Support and Investment Platform of the Global E-mobility Programme (report to be prepared after each workshop)
1.3.7	Key Malagasy stakeholders participate in the other events, trainings or workshops organized by the Africa Support and Investment Platform of the Global E-mobility Programme (report to be prepared after each event)??
1.3.8	Training activities on e-mobility policies, standards and regulations, addressing civil servants, and public and private decision-makers
1.3.9	Quarterly implementation reports of the communication, training and dissemination plan are submitted to the inter-sectoral e-mobility subcommittee
1.3.10	Recommendations for replication in Madagascar are developed, based on the results of the EV Global Programme replication event

Table 16: Deliverables included in output 1.3

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

EVs are already used in a variety of sectors around the world, including public and private fleets, public transport services, taxis, and individuals. These experiences show the convenience of starting the introduction of EVs in those segments and for mobility services better suited to their characteristics and better aligned with the principles of sustainable mobility. In the case of Madagascar, near and medium-term options to electrify transportation include 2&3 wheelers both for individual and public transport service use, and buses.

The demonstration projects in Antananarivo and Toamasina intend to remove two short-term barriers by: (1) providing inputs to strategic documents to improve urban public transport operations in the two cities including the subsequent electrification of public transport vehicles such as mini-buses and buses, and (2) providing first-hand evidence of the technical and economic performance of electric 2Ws and 3Ws to individual users, public and private fleet managers, government officials and other key transport stakeholders. Such strategic planning shall also include the option of government re-engaging in public transportation operations. Currently, private bus operators are not in the position to invest into new vehicles, let alone electric vehicles. However, it is anticipated that government is to play a more substantial role in the public transport sector in the future.

In Antananarivo, large numbers of scooters are used for individual mobility. Such individually used ICE scooters, with daily distances driven of 30 km and less, can be replaced by electric scooters, which are already available on the market at competitive prices. For this, the public needs to be sensitized on the opportunities of using electric vehicles, to which the demonstration of electric motorcycles and scooters in publicly and privately operated fleets will contribute. In addition, it is currently under discussion to eventually permit the use of 2&3 wheelers for public transport services. The demonstration of electric 2&3 wheelers will provide useful insights as to which such an opening of the public transport sector contributes to overall improvement of quality of service or not. Based on the results of the demonstration, strategic planning of public transport services considering a separation of trunk lines being served by buses and minibuses, and feeder lines being served by other means of transport including electric 2&3 wheelers will be carried out in the capital. The project envisages to support the operation of a fleet of up to 45 electric motorcycles, of which 25, including the necessary charging equipment, will be donated by the project to the local police and the rest will be procured and operated by private corporations (to be identified) in their own fleets, alongside technical assistance and basic electronic monitoring tools for the sustainable management of the fleet.

Similarly, over the past decade 3 wheelers have completely displaced regular urban bus services in Toamasina. Although regulated and licensed by the municipality to provide services along certain routes, their low capacity, the limited road space available and the proliferation of irregular operators with a variety of small capacity vehicles providing taxi services with many of them non-motorized such as rickshaws or even bicycles, have exacerbated traffic congestion and road safety problems in the city. The city intends to recover regular bus services starting with the operation of a fleet of about 10 buses along one or two corridors. The project's contribution to a shift towards sustainable public transportation will focus on the provision of public charging infrastructure for electric 3 wheelers as well as the demonstration of advanced electric 3 wheelers for passenger transport along corridors, which shall not be served by the publicly operated buses. In doing so, the principle of trunk lines being

served by higher-capacity buses in conjunction with feeder lines being served by 3 wheelers, including EVs, will be introduced to the city of Toamasina. Such separation of services will serve as a baseline to further improve public transport in the city, and to test business models which will subsequently allow for the introduction of advanced technology such as electric buses. By improving operation of public transport based on strategic decisions (such as where to license which modes of transport), sustainable business cases will be developed, which are necessary to attract finance into the public transport sector. The project envisages the financing of up to 25 state of the art lithium-ion battery electric 3 wheelers (with an incentive associated to the scrapping of the old vehicle) and the provision of charging infrastructure alongside agreed corridors in Toamasina.

EVs? 2&3W demonstrations are expected to mobilize public and private stakeholders (reaching out to the private sector, and to vehicle dealers and importers) to explore the opportunities they could seize from electrification, to undertake the necessary staff training and to assess their needs of charging infrastructure. Additionally, the project's MRV system during the demonstration will serve to showcase the effectiveness of GPS-tracking in fleet management. The project will ensure that the electric 2&3W fleets will be highly visible in Antananarivo and Toamasina through appropriate logos in the vehicles and in the required charging infrastructure (financed by the project within this component), and that the latter will be publicly accessible in case other fleet owners outside the project decide to procure electric vehicles.

Outcome 2: Demonstrations provide evidence of technical, financial and environmental sustainability to plan for scale-up of low-carbon electric mobility, including in optimized public transport bus services.

Outputs:

? *Output 2.1: As a prior step for electrification, recommendations are provided for the optimization of public transport operations in one public transport corridor in Antananarivo, reserving the trunk lines to higher capacity vehicles including larger buses and the feeder lines to low-capacity transport means such as 2&3wheelers.*

In the absence of sufficient traffic management measures and adequate distribution of the scarce road space among transport modes, busy streets in city centers easily become a source of externalities with pedestrians relegated by too much motorized traffic, buses and other high-capacity vehicles stuck by the maneuvering of motorcycles and other small vehicles relegating pedestrians, and unclear rules to solve driving conflicts. This results in higher risk of accidents- especially for pedestrians-, low traffic speeds- especially for public transport vehicles- and poor environmental quality for residents and street users alike.

Sustainable transport modes (especially walking and public transport) are likely to suffer most from this situation, and measures to introduce cleaner technologies are unlikely to deliver the desired results without previously reestablishing an adequate distribution of the available transport corridors among competing transport operators and private users.

The project will provide tailored recommendations to address the challenge to inter-operate high and low capacity public transport service vehicles on critical corridors in Antananarivo. The objective is to license the operation of selected public transport service modes including buses (30 seats and more plus driver), mini-buses (20 seats plus driver), taxis (3 seats plus driver), 3 wheelers (3 seats plus driver) and motorcycles (1 seat plus driver) on different roads and to clearly distinguish between higher-capacity vehicle trunk lines and lower capacity vehicle feeder lines. This approach should result in reducing congestion and increasing average traffic, avoiding competition and fostering complementarity and cooperation among PT means while improving the profitability of transport operations and improving overall public transport capacity and quality of service.

These recommendations shall serve as a baseline to develop advanced urban mobility plans in Antananarivo, focusing on the provision of efficient public transportation and shall be used to engage financial institutions in the discussion about financing the necessary infrastructure and rolling stock in Antananarivo. By providing recommendations on how to improve the business models for various public transport service operations based on clear licensing of different vehicle modes to corridors and districts, and by linking such improved operations to the introduction of clean vehicle technologies such as EVs, it is expected to increase interest among financiers to support the shift towards clean and efficient public transport systems in Madagascar.

#	Deliverable Description
2.1.1	Local advisory group is established to provide guidance on project's actions in Antananarivo
2.1.2	Main corridors in Antananarivo with potential to combine 2&3W feeders and trunk bus services are identified, based on existing and newly collected data on public transport demand
2.1.3	A corridor is selected by the local advisory group and a draft Corridor Plan providing input for optimization of public transport services is delivered defining routes and operating conditions for all public transport means, as well as infrastructure and rolling stock needs
2.1.4	The mobility demand and needs in the corridor, including those of women and vulnerable groups, is analyzed.
2.1.5	Based on identified improved operation schemes, business models (including social impacts) are developed for operators of public transport fleets in the selected corridor (2&3Ws, buses).
2.1.6	Tailored short-term recommendations to optimize operations in the corridor are validated by local stakeholders and the national government

Table 17: Deliverables included in output 2.1

? *Output 2.2: As a prior step for electrification, support is provided for the optimization of the public transport system of Toamasina through the transition towards trunk lines to be served by higher capacity vehicles (buses and mini-buses) and the relocation of current low-capacity means (3 wheelers) as feeders of the principal lines and low-demand routes.*

Based to reasoning similar to the intervention of output 2.1 in Antananarivo, the project will support the municipality of Toamasina in its effort to reintroduce regular bus-served lines by providing tailored recommendations to inter-operate the new buses with low capacity 3Ws. The initial approach is to license the operation of selected public transport service modes including buses (30 seats and more plus driver), mini-buses (20 seats plus driver), 3 wheelers (3 seats plus driver) and eventually 2Ws motorcycles (1 seat plus driver) and non-motorized vehicles among different roads and to distinguish into higher-capacity vehicle trunk lines and lower capacity vehicle feeder lines. The transition as buses and minibuses are reintroduced is especially challenging for the currently dominant 3Ws. As in Antananarivo, the approach is expected to (1) reduce congestion and increase average speed of traffic; (2) reduce competition among various modes of public transport service to provide for better rentability of transport operations, and (3) improve overall public transport capacity and quality of service.

These recommendations shall serve as a baseline to develop a sustainable urban mobility plan for Toamasina, focusing on the provision of efficient public transportation and shall be used to engage financial institutions in the discussion about financing the necessary infrastructure and rolling stock, and to support re-introduction of formal public transport operations in Toamasina. By providing recommendations on how to improve the business models for various public transport service operations based on clear licensing of different vehicle modes to corridors and districts, and by linking such improved operations to the introduction of clean vehicle technologies such as EVs, it is expected to increase interest among financiers to support the shift towards clean and efficient public transport systems in Madagascar.

#	Deliverable Description
2.2.1	Local advisory group is established to provide guidance on project's actions in Toamasina
2.2.2	Two alternative optimization public transport network plans are developed for Toamasina, based on a combination of the introduction of trunk bus lines and feeder and peripheral low-capacity (3W) lines
2.2.3	An optimization plan is selected by the local advisory group and developed in detail, including routes and operating conditions for all public transport means, as well as infrastructure and rolling stock needs
2.2.4	The mobility demand and needs in Toamasina, including those of women and vulnerable groups, is analyzed
2.2.5	Business models (including social impacts) are developed for operators of the various public transport means in Toamasina
2.2.6	Tailored short-term recommendations to optimize operations in Toamasina are validated by local stakeholders and the national government

Table 18: Deliverables included in output 2.2

? *Output 2.3 A pilot monitoring system is implemented in the selected public transport corridor in Antananarivo and a roadmap is prepared for future electrification, in synergy with the actions of the municipality to optimize the network and the national government's support to the introduction of larger buses*

The project follows a tailored approach in each of the two pilot cities to establish roadmaps for the future electrification of urban transport services. In the case of Antananarivo, urban buses are already in service, although with critical limitations in terms of vehicle size, age and performance. The project's approach is to accompany the actions foreseen by the national and local governments plans (in particular, the expected implementation of a significant number of larger buses with the financial support of the national government announced in July 2022). The project will select a sample of bus lines serving one main route in Antananarivo and will analyze the operations of the vehicles serving those lines, and the characteristics of the passengers using them, including those of vulnerable groups (such as persons with reduced mobility and women). The analysis of this information will be complemented by the assessment of critical needs for an effective management and supervision of the bus services by the municipal authorities and the development of recommendations for the optimization of bus services, including the provision of some critical equipment such as computers and bus control software.

Based on the information gathered, the project will deliver a roadmap for the electrification of the bus fleets in Antananarivo (as well as 3W providing PT services, if considered necessary), including detailed financial assessments and business cases to facilitate the access of the municipalities to donors and international financial institutions.

The activities conducted within this output are presented in the table below.

#	Deliverable Description
2.3.1	Enhanced supervisory capabilities are implemented in the municipal administration in Antananarivo for licensing and supervision of public transport services (3Ws, minibuses and buses), including training and delivery of monitoring system for the corridor.
2.3.2	Public transport licenses and operations in the pilot corridor are monitored and evaluated.
2.3.3	Based on the monitored corridor, business plans to scale-up optimized operations and to electrify 2&3W and bus fleets in Antananarivo are developed and validated with local stakeholders and national government.
2.3.4	A roadmap for scaling-up the optimization and electrification of public transport lines (3Ws and buses) in Antananarivo is provided, including a concept for bankable project to be submitted to IFIs.

Table 19: Deliverables included in output 2.3

? *Output 2.4 A pilot monitoring system is implemented along the planned trunk lines in Toamasina, and a roadmap is prepared for the electrification of the fleet, including current low-capacity vehicles (3Ws) and future buses*

In the case of Toamasina, urban buses are expected to be reintroduced soon by the municipality, and the project's approach is to accompany the municipality in this process, providing some additional technical assistance. The project will analyze traffic and mobility conditions in the four routes that have been selected by the municipality for the new services and will provide technical recommendations for their efficient operation (vehicle's technical characteristics, schedule, bus stops, etc.), including consideration of the mobility needs of vulnerable groups (such as persons with reduced mobility and women). This will be complemented by the assessment of critical needs for an effective management and supervision of the future bus services by the municipal authorities (and eventually of 3W services, if necessary), including the provision of some critical equipment such as computers and bus control software.

Based on the information gathered, the project will provide a roadmap for the electrification of the public transport fleets (buses and 3Ws) along with the progressive reintroduction of buses in Toamasina, including detailed financial assessments and business cases to facilitate the access of the municipalities to donors and international financial institutions.

The activities conducted within this output are presented in the table below.

#	Deliverable Description
2.4.1	Enhanced supervisory capabilities are implemented in the municipal administration of Toamasina for licensing and supervision of public transport services (current 3Ws and new minibuses and buses), including training and delivery of monitoring system for the corridor.
2.4.2	Public transport licenses and operations in Toamasina are monitored and evaluated.
2.4.3	Development and assessment of alternatives to electrify 3W and bus operations in Toamasina.
2.4.4	Roadmap for electrification of the 3W and bus fleet in Toamasina and development of a bankable business case to be submitted to IFIs.

Table 20: Deliverables included in output 2.4

? *Output 2.5, The feasibility of the electrification scheme is validated in what refers to technical specifications of 2Ws in Antananarivo, through the operation of one public and one private 2W fleets and evaluation reports are submitted to the government.*

Experience with EV technology is critical to provide the necessary evidence to local stakeholders regarding the operational and economic advantages of e-mobility and its suitability for Madagascar and, in particular, for Antananarivo. Considering the significant limitations of the current public

transport system in this city, such technological demonstration is targeting the rapidly growing segment of motorcycles (2Ws).

The rapid growth of individually owned two-stroke ICE scooters in Antananarivo is a consequence of the degrading public transport sector and the resulting congestion. While providing individual mobility, they create costly externalities such as high level of air pollution, safety risk, additional congestion and loss of passengers and revenue for mini-bus operators. Improvements in the public transport system and more stringent control of driving permits, vehicle roadworthiness and access to the city center should reduce their appeal and curb their growth. Nevertheless, motorcycles and scooters will remain convenient for many public and private entities as well as individuals providing services requiring high flexibility and an ability to beat traffic congestion. Examples include municipal police or courier and delivery services. The project intends to work with such potential institutional or corporate users in order to foster the electrification of their fleets. The results of this pilot will encourage other motorcycle and scooter users (or even car users) to consider the adoption of electric vehicles.

In the case of the local (communal) police, the project will provide a fleet of up to 25 electric motorcycles and a computer-assisted fleet management system to properly follow their performance and to compare it with the rest of the fleet. The procurement will be made by the executing agency (including 2-year maintenance and repairs), and subsequently transferred to the municipality of Antananarivo with a memorandum of understanding indicating the reporting commitments to be followed by the beneficiary to guarantee appropriate monitoring and evaluation. After the 2-year maintenance period, the local police is expected to start taking full responsibility of fleet maintenance, and this experience will help them to explore plans to eventually expand its e2W fleet during or beyond the project's lifespan. The project can assist the local police during this transition and identify and address eventual challenges in their taking more responsibility of fleet maintenance and ultimately, make their future fleet expansion plan.

In the case of the private fleet manager in Antananarivo, the project will launch a request for participation to select the best suitable partner. Exchanges with 2W importers during project preparation have shown that there is an interest in electric 2W, at least from local brands of large international corporations in the communications and urban logistics sectors, and that such transition is likely to be supported by their international headquarters. The selected partner will need to purchase the electric motorcycles (a fleet of 20 units has been estimated) using its own funds, but will receive technical support of the Madagascar project and the global e-mobility programme for the identification of the appropriate model, manufacturer and importer (eventually looking for synergies with the procurement of e2Ws by the project for the police in Antananarivo) as well as for the identification of the optimal charging operation (fixed charging vs. battery swapping). The project will also provide technical assistance for the adaptation of the partner's fleet management system to the requirements of the project's monitoring and evaluation plans, including the equipment required for the integration of the fleet in the project's fleet monitoring system in Antananarivo and will provide the necessary know how and human resources for regular data collection and analysis.

The pilot project will be prepared based on an extensive feasibility study to: 1.) Determine technical specifications of the electric 2 wheelers (range, power, speed, gradeability, load, price, fixed batteries vs. swappable batteries etc.); 2.) Determine the technical specifications and operation scheme for

battery charging (mainly fixed charging vs. swapping) as well as their strategic location; 3.) Develop a detailed implementation plan for the pilot; 4.) Develop a monitoring, reporting and verification scheme; and 5.) Develop terms of references and other necessary documentation for the private sector pilot.

With the support of an external consultancy, the PMU will validate the results with local stakeholders and UNEP and prepare a report presenting the results for publication and wide dissemination.

The activities conducted within this output are presented in the table below.

#	Deliverable Description
2.5.1	Feasibility study for the electrification of one pilot fleet of 2Ws in Antananarivo.
2.5.2	Professional training for driving and maintenance of electric 2Ws.
2.5.3	Implementation, monitoring and evaluation of one pilot fleet of electric 2Ws in one public institution in Antananarivo and one public charging station.
2.5.4	Implementation, monitoring and evaluation of one pilot fleet of electric 2Ws in one private company in Antananarivo.
2.5.5	The Antananarivo pilot's results are validated, published and disseminated.
2.5.6	Recommendations for the electrification of the public transport fleet in Antananarivo are updated base? on the pilot's results.

Table 21: Deliverables included in output 2.5

? *Output 2.6, The feasibility of the electrification transition is validated in what refers to the replacement of conventional 3Ws by electric ones in public transport services in Toamasina, through a scrappage scheme providing incremental incentives to operators, and evaluation reports are submitted to the government*

Experience with EV technology is critical to provide the necessary evidence to local stakeholders regarding the operational and economic advantages of e-mobility and its suitability for Madagascar and, in particular, for Toamasina. Considering the particular characteristics of the 3W-dominated public transport system in Toamasina, such technological demonstration is targeting 3Ws, while supporting the municipality's efforts to reintroduce buses in the lines with higher demand.

Currently, a fleet of around 300 electric 3 wheelers for public passenger transport is already in use in Toamasina. These e-3 wheelers mostly use lead acid batteries for electricity storage. Consequently, these e-3Ws have very limited range, power and speed, and therefore contribute to degrading public transportation in Toamasina. The project will support the piloting of up to 20 advanced lithium-ion battery powered e-3Ws and will finance the installation of at least 2 public charging stations. The operation of the demo e-3Ws and charging stations will be on corridors not served by the bus fleet, which is to be re-introduced and operated by the municipality of Toamasina.

The pilot project will be prepared based on an extensive feasibility study to: 1.) Determine technical specifications of the electric 3 wheelers (range, power, speed, gradeability, load, price, fixed batteries vs. swappable batteries etc.), including the avoidance of premature obsolescence of the vehicles, making sure they will be competitive during their whole lifespan of at least 45 years; 2.) Determine the technical specifications and operation scheme for battery charging (mainly fixed charging vs. swapping) as well as their strategic location; 3.) Develop a detailed implementation plan for the pilot alongside re-introduction of a number of publicly operated buses; and 4.) Develop a monitoring, reporting and verification scheme.

Based on the feasibility study, the project will launch a call for proposals to select the 3W operators that will participate in the scrappage scheme. These operators will act as project's responsible parties for deliverable 2.6.4. They will receive a project's contribution (the amount of the contribution requested will be used during the selection process to choose the operators) in exchanging of scrapping ICE 3W and procuring and registering under their names an equal quantity of e3W to replace it and regularly reporting to the project on the operating performance of the 3W while providing public transport services in Toamasina. The project's contribution requested by the selected operators is a lump sum to cover the incremental expenditures estimated by the operator for purchasing and operating the e3W, inclusive of all maintenance, insurance and operating costs foreseen, and will be disbursed in two tranches: the first one at the time of signature of the agreement with each responsible party and the second one at the time of at least two months or 2,000 km of operations completed and reported. Due to the lower operating costs of e3Ws, their owners are expected to be interested in continuing their operation until the end of their lifespan, and even continuing electrifying their fleets, without requiring further project's support.

With the support of an external consultancy, the PMU will validate the results with local stakeholders and UNEP and prepare a report presenting the results for publication and wide dissemination.

The activities conducted within this output are presented in the table below.

#	Deliverable Description
2.6.1	Feasibility study of a scrappage scheme of motorized 3Ws providing public transport services in Toamasina and their replacement by electric 3Ws with lithium batteries.
2.6.2	Professional training for driving and maintenance of electric 3Ws.
2.6.3	Professional training for assembling of 2Ws and 3Ws.
2.6.4	Implementation, monitoring and evaluation of a pilot of the scrappage scheme to operate up to 25 electric 3Ws in Toamasina and one public charging station.
2.6.5	The pilots' results are validated, published and disseminated.
2.6.6	Recommendations for the electrification of the public transport fleet in Toamasina are updated base on the pilot's results.

Table 22: Deliverables included in output 2.6

EVs

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

This component bridges the gap between institutionalization and demonstration on one side and market preparation on the other side. It will support the preparation of a market for EVs, primarily for the vehicle categories included in the pilots (directly, 2&3Ws; indirectly, buses) and subsequently for other categories such as light duty vehicles for passengers (cars) and freight (vans). This requires development of an adequate regulatory framework (output 3.1), followed by sound and robust alternative business and financing models for fleet electrification, endorsed by local banks and insurance companies (output 3.2), building upon the results obtained during the demonstrations.

The necessity of a robust regulatory and fiscal framework for electric vehicles in Madagascar is amplified by the fact that most vehicles being registered in Madagascar for the first time are used imported vehicles from Europe, notably France. In 2021, 16% of all new light duty vehicle registered in the EU were EVs (20% in France)^[40]⁴⁰. Furthermore, the EU introduced a law in October 2022 to effectively ban the sale of new petrol and diesel cars from 2035. This means that the import of used electric vehicle to Madagascar can be expected to pick up in the next 5 years, based on the first generation of used EVs leaving the EU, and increasing quickly as the shift to 100% electric vehicles accelerates. While importing used EVs can be a means of making the technology affordable and facilitating the development of attractive business models by the influx of affordable used EVs, it also comes with risks such as the collection of EV batteries for re-use and recycling.

Currently, financing for fleet renewal is hardly available to private companies in the transport sector in Madagascar, mainly due to a lack of own capital and credit worthiness of the market actors. Therefore, the project needs to provide sound evidence to the local financial sector about the future prospects of the public transport sector, and of the diminished risks associated to the acquisition and operation of electric vehicles, including used electric vehicles, compared to current practices. To overcome the uncertainties associated to the higher upfront costs of EVs, the project will cooperate with the relevant stakeholders (e.g., the local financial industry, insurance companies, vehicle importers and dealers and investors) in designing adapted lending and leasing facilities.

The preparation for scale up and replication will be supported by communication activities targeting the main stakeholders (fleet managers, dealers of the various vehicle categories, local officials and decision makers, etc.) through all available communication channels, including a project's website to provide public access to the project's documentation.

Outcome 3: Conditions are created to shift market towards low-carbon electric mobility and accelerate introduction of appropriate electric vehicles in Madagascar.

Outputs:

? *Output 3.1: Fiscal and regulatory reforms to incentivize the uptake of electric mobility are submitted to the government for approval.*

Based on the gaps identified in the national e-mobility strategy developed under component 1, and with the support of the Global Programme materials, an array of regulatory proposals will be developed and submitted to the GoMG for adoption. These proposals include 1) A reform of vehicle import taxation to incentivize the purchase and import of energy efficient and clean vehicles; 2) A reform of vehicle import regulation to incentivize the purchase and import of energy efficient and clean vehicles, 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; 4) A reform of the authorization system for the provision of urban public transport services, providing fairer competition conditions and assuring reasonable quality of service; 5) A new framework to regulate the provision of charging infrastructures for EVs, including for battery swapping schemes; 6.) Initial regulations for the import of used EVs (e.g., based on an age limit to prevent influx of used EVs with limited range until better measures such as mandatory battery state of health indicators are introduced globally).

This output addresses the market barrier created by the current fiscal and regulatory framework in Madagascar, hostile to the introduction of EVs in the road fleet and, in particular, in the public transport sector. The proposals for reform need to address a variety of challenges in a consistent way. The first one is the reform of the fiscal and regulatory framework for vehicle imports, including electric ones (deliverables 3.1.1 and 3.1.2). The second one is the reform of the regulatory framework for vehicle registration, so that low-carbon vehicles are incentivized (deliverable 3.1.3). The third one is the update of the requirements for the authorization of urban public transport services (Deliverable 3.1.4, with a focus on Antananarivo and Toamasina), so that licenses be subject to more stringent technical requisites for the vehicles, eventually including a staged approach to the prioritization of electric vehicles, starting with particular categories (such as 2&3 wheelers) geographical areas (e.g., districts with certain conditions) or PT lines (e.g., with certain demand thresholds), as well as the supervision and control procedures; a similar scheme can be envisaged for the authorization process of 3Ws in Toamasina, within a strategy to progressively phase-out non-electric 3Ws. . The last one is the setting up of regulations and technical standards for the installation and operation of public and private charging stations (Deliverable 3.1.5), aligned with the national gender-sensitive e-mobility strategy (output 1.2) and permitting sales of electricity via third party EV charging service providers. All the regulatory reform proposals will be validated with the project's stakeholders (mainly participating ministries, local governments, and regulatory and fiscal experts) through workshops (with a participation of some 30 participants at each one) before being submitted to the PSC for approval. The revised recommendations will be presented to the GoMG at a final public workshop and submitted for its consideration and approval.

This output includes the deliverables presented in the table below.

#	Deliverable Description
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3.1.1	A draft proposal to reform vehicle import taxation is developed (including impact on fiscal stability), circulated for review and presented at a workshop.
3.1.2	A draft proposal to reform vehicle import regulation is developed, circulated for review and presented at a workshop, including the import of used EVs.
3.1.3	A draft proposal to reform vehicle registration is developed, circulated for review and presented at a workshop.
3.1.4	A draft proposal to reform urban public transport licensing is developed, circulated for review and presented at a workshop.
3.1.5	Technical standards and a draft proposal on private and public charging infrastructure facilities (including battery swapping) are developed, circulated for review and presented at a workshop.
3.1.6	A consolidated package of policy proposals is presented at a workshop and submitted to the government for adoption.

Table 23: Deliverables included in output 3.1

? *Output 3.2: Financing schemes are developed and submitted for implementation, including procurement guidelines (e.g. technical specifications) for the scaling-up of electrification of bus, 2&3W fleets.*

This output addresses the market-related barrier due to the difficult access of investors in the transport sector (and particularly public transport operators in general, including those active in the 3W segment) to financial services. As EVs require higher upfront investments, the business case for electrification is not clear in a sector dominated by small entrepreneurs, even if operating cost savings along the vehicle's lifespan outweigh the additional capital costs. In a first step it is therefore necessary to develop business models, which identify financing needs and revenue streams adapted to local market conditions and based on the reforms and re-organization of public transport services proposed in component 2 and output 3.1. In a second step, these business models will feed into the design of financial schemes, which will be developed in co-operation with interested partners from the financial sector. It is envisaged to develop business models and subsequently financing schemes for electric 2&3 wheelers as well as mini-buses and buses for public transport service provision. The development of business models will be based on documents provided by the Global Programme, for example on technical specifications, prices, market and availability of electric 2&3 wheelers in Africa. Business models developed will include procurement guidelines to help fleet operator to make informed decisions about which vehicles and charging options to choose aligned with their use profile. Results of this output will be presented at a dedicated workshop.

The business models and financing schemes developed will be based on the scenarios and forecasts established in output 1.2 for the different vehicle categories, with a focus on urban public transport fleets and corporate fleets. The business models, financial schemes and procurement guidelines will contribute to overcome the financial barriers involved in the purchase of electric vehicles by creating

and strengthening strategies to finance the initial capital cost requirements, enabling the participation and investment of the private sector.

The design of business models and financial schemes will be consistent with the fiscal and regulatory reforms developed in output 3.1, as well as the consideration of different leasing and vehicle loans options, based on international experience, with the participation of the public and private financial sectors, and their adaptation to the particular needs (terms of lending, concessionality level) of bus operators and public and private fleets. Leasing schemes could provide an attractive alternative to vehicle procurement. Leasing schemes concerning vehicles and batteries, and alternative payment options through energy supply contracts have been proposed and, in some cases, implemented by some fleet managers around the world. The advantages of leasing options are strongly linked to their taxing regime and to the development and competition within the local financial sector. This output includes the deliverables presented in the table below.

#	Deliverable Description
3.2.1	Guidelines for electrification of public and private fleets, including scenarios and business models for 2&3W, minibuses and buses, and industrial aspects such as assembling and maintenance.
3.2.2	Draft report on financial schemes to support fleet electrification (including gender aspects) circulated for consultation among local financial institutions.
3.2.3	Final report on financial schemes to support fleet electrification.
3.2.4	Financial schemes (including gender aspects) are submitted to the government and the local financial sector for adoption and implementation.
3.2.5	Industrial opportunities in the field of assembling electric 2&3Ws in Madagascar are assessed, and a introductory training workshop is provided to 14 professionals

Table 24: Deliverables included in output 3.2

? *Output 3.3: A communication plan is prepared and communication materials and campaigns are designed.*

This output provides a communication plan defining the project's communication activities and campaigns and their target groups and channels, as well as all the materials necessary for such activities. These materials will provide easier access to the project's key contributions, stimulating more active engagement and public debates and ultimately paving the way for the consensus needed for the adoption of electric mobility. Following the communication and dissemination plan, these materials will be used in the communication campaigns foreseen in output 3.4, and the training activities undertaken in output 2.3. The materials cover the following key areas of the project's contributions: (1) the national e-mobility strategy, (2) the new fiscal and regulatory framework, (3) technical training on

the vehicle and charging technologies of e-mobility, (4) the results of the demonstrations and the guidelines for the electrification of fleets, (5) materials on sustainable urban mobility, providing a wider context for e-mobility, to raise awareness on the promotion of walking and public transport as cornerstones of urban mobility, and (6) technical training in e-waste management, covering the handling, re-use and recycling of EV batteries. Therefore, this output includes the deliverables presented in the table below.

#	Deliverable Description
3.3.1	The communication plan is prepared
3.3.2	Communication materials on the national e-mobility strategy.
3.3.3	Communication materials on the new regulatory and fiscal framework.
3.3.4	Communication materials on the project demonstrations? results and sustainable (including electrification) fleet management.
3.3.5	Communication materials on sustainable urban mobility, with a focus on non-motorized transport and public transport services.

Table 25: Deliverables included in output 3.3

? *Output 3.4: Communication campaigns and project webpage are implemented, raising awareness and interest from key stakeholders and the general public.*

This output implements the communication plan and makes use of the materials prepared in output 3.3 through the project website and through four dedicated campaigns. Two of these campaigns will accompany and support the implementation of the demonstrations, providing information to the local stakeholders and citizens in Antananarivo and Toamasina. Another campaign will support the preparation and adoption of the national e-mobility strategy. The final campaign will communicate the main results and lessons learnt of the project, as a way to facilitate their sustainability after project?s completion. The campaigns will make use of the communication channels established in the communication plan, which besides the project?s website are likely to include the local press, radio and television channels, social media and a list of distribution including institutions and individuals participating in any of the project?s activities, Therefore, this output includes the deliverables presented in the table below.

#	Deliverable Description
3.4.1	The communication channels (including the project website) are operational, and relevant materials are monthly produced and uploaded, under the supervision of the e-mobility subcommittee.
3.4.2	Communication campaign in Antananarivo, to present the scope of the project demonstration, including gender dimensions in urban mobility.
3.4.3	Communication campaign in Toamasina, to present the scope of the project demonstration, including gender dimensions in urban mobility.
3.4.4	Communication campaign at the national level on the e-mobility strategy.
3.4.5	Communication campaign at the national level on the project's key achievements, including the demonstration results??.

Table 26: Deliverables included in output 3.4

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

Long term sustainability of e-mobility addresses to main areas of work: how to address end-of-life issues of used EV batteries and how to make use of low carbon electricity for vehicle charging. E-waste is a source of environmental hazards, which is likely to increase with the introduction of EVs. Currently, the regulatory framework for waste management in Madagascar is not fit for purpose as it does not include sufficient secondary legislation for the management of electronic waste (e-waste). This includes the collection, and separation of e-waste and subsequently its recycling or disposal. With the introduction and scaling up of e-mobility, potential changes in orders of magnitudes have to be anticipated. So far, no global guidelines on how to deal with end-of-life EV batteries eventually ending up in low and middle countries have been established. UNEP and partnering organizations will work towards establishment of policies and guidelines on how to re-introduce end-of-life EV batteries in global EV value chains. However, in the meantime there is no time to lose to prepare local regulatory frameworks to ensure that used EV batteries will not end up in landfills but will be collected in an organized manner to prepare for subsequent steps. So far, companies and individuals dedicated to the management of end-of-life vehicles do not have the robustness and capacity necessary to address this additional challenge. As identified at the Safeguard Risk Identification Form (SRIF), the future management for EVs at their end-of-life requires strengthening of current e-waste management chains and to introduce an adequate management approach for end-of-life EV batteries.

So far, it is unclear whether the original EV (or battery) producer will be held responsible for the second-life use of its batteries, or whether this will be left to market forces, due to the relatively high value of some components of the used batteries. It is however clear that most of the regulation to be developed in the short term will mainly concern primary markets in Europe, North America and Asia. Extended producer responsibility will most likely not be an efficient tool to regulate secondhand EV end-of-life issues in the Global South. It is therefore of utmost urgency to sensitize national and local decision makers in Madagascar on the upcoming issue of end-of-life EV batteries and to investigate the

options for collection of used EV batteries for re-use, recycling and safe disposal. For example, in the early stages of EV deployment in Madagascar, finding options for used EV batteries for second life applications either for energy storage, or for production of new battery packs based on tested used battery can be smart ways to tackle the issue of end-of-life EV batteries. This component will address these issues comprehensively, including the promotion of second-life battery use.

Another key challenge for environmental sustainability refers to the availability and reliability of low-carbon electricity. Currently, Madagascar faces undersupply of electricity, but this challenge is likely to be addressed through the completion of different hydraulic and other RE generation projects currently under construction or in the pipeline. While large infrastructure projects address shortage of power supply in the economic and urban centers of Madagascar, lack of access to grid electricity in rural areas is likely to continue beyond the short and medium term. Therefore, the project will further investigate the development of off-grid RE generation options integrated with the deployment of the EV charging networks.

Therefore, this component targets the development of initial strategies to ensure environmental sustainability of the introduction of electric mobility in Madagascar. It focuses on three main areas, each with one specific output: (1) The integration of renewable power for charging of electric vehicles; (2) The development and update of the current legal framework on e-waste management in accordance with good international practice, so that it can foster a reliable e-waste collection and management system; and (3) building up the necessary capacities through professional training of at least 40 future trainers and the selection and operation of at least one company to collect, re-use and recycle e-waste, including used e-mobility batteries. Acknowledging the constrained budget and the scope of the task, this component is understood as a first step to sensitize project stakeholders about these challenges and to start working in parallel with the introduction of electric vehicles on the issues of waste management and sustainable power supply.

Outcome 4: Measures are developed to ensure the long-term environmental sustainability of low-carbon electric mobility

Outputs:

? *Output 4.1: A study to integrate renewable power for electric vehicle recharging is carried out.*

This output addresses the integration of low-carbon power for EV charging in Madagascar. It responds to one of the barriers generating potentially high environmental impacts from e-mobility: The unreliability of power supply and the significant carbon footprint of used power.

With the support of UNEP SMU and an international consultant, this output will undertake a study on the technical and financial feasibility of off-grid renewable energy solutions (including rural mini and micro grids) to provide the electricity required for transport electrification, including its potential to

support electric 2W-based rural mobility. It is worth noticing that the additional power demand required by locally used electric 2Ws can significantly improve the economics of off-grid applications in small communities. The study will also explore the potential to attract donors and investors to such off-grid RE generation, and in particular in rural electrification projects including an electric mobility component. During project implementation, eventual synergies with the EU funded ENERGICA project targeting the installation of a rural mini-grid will be evaluated. The recommendations will be circulated for validation with JIRAMA and ADER (*Agence de Développement de l'Électrification Rurale*), as well as among international donors and institutions active in Madagascar and subsequently submitted to the GoMG for consideration.

#	Deliverable Description
4.1.1	A study to evaluate the potential for off-grid power generation and light EV charging integration including relevant business models for rural areas is developed.
4.1.2	The study's recommendations and technical standards to integrate renewable power with electric vehicle recharging systems are developed and circulated for review and validation
4.1.3	The validated recommendations and technical standards to integrate renewable power with electric vehicle recharging systems are submitted to the government for implementation

Table 27: Deliverables included in output 4.1

Output 4.2: The country's framework for e-waste collection is revised, in order to integrate electric vehicle batteries.

This output addresses the development of the legislative framework and intends to raise local awareness and capacity regarding the management of e-waste and end-of-life EV batteries. This is a relevant environmental barrier for the deployment of EVs in Madagascar, as in the absence of adequate management systems, EV batteries would create at their end-of-life additional environmental hazards.

Currently, there are no reliable data available on e-waste management. The legislation in place (Decree n° 2015-930) identifies five wide categories of e-waste and holds the importer responsible for the financing the management of these products at their end of life. However, this legislation is currently not enforced. Based on these considerations, the project intends to provide the government with a factual, data-based assessment of the current situation on e-waste, the expected future generation of additional e-waste from electric vehicles and with recommendations to address the new challenge of EV batteries while strengthening the general e-waste management system. Furthermore, the project intends to provide some transitional and provisional actions that can mitigate the environmental hazards associated to the introduction of electric 2&3Ws (with a relatively short lifespan) during the project. The study and recommendations will be completed with the support of an international consultant and submitted to the government for consideration. These will provide the basis for setting

up an e-waste collection system in Toamasina, as envisaged in output 4.3, through the deliverables in the table below:

#	Deliverable Description
4.2.1	A report summarizing the state of the art of e-waste collection in Madagascar as well as international best practices in e-waste collection (including EV batteries) is completed after validation by local stakeholders
4.2.2	A roadmap to strengthen the e-waste management sector in Madagascar and to enable it to manage EV batteries is completed
4.2.3	A proposal for the reform of national e-waste management regulations is submitted to the government for adoption

Table 28: Deliverables included in output 4.2

? *Output 4.3 Training and technical support is provided to handle used EV batteries from 3Ws in Toamasina, and a scheme for collection, re-use, recycling and sound disposal of used electric vehicle batteries is developed and submitted for adoption.*

This output provides the necessary framework for the effective use of the technical capacities provided in outputs 3.3 and 4.2 to the effective management of e-waste in the country, starting with a practical application in Toamasina for the management of electric 3Ws at their end of life. It includes studies on the potential of the e-waste management market in Toamasina, and the development of business plans for individuals and companies already active in this sector or interested in it. Two train-the-trainers workshops will be held in Toamasina to strengthen the necessary technical capacities of at least 40 trainers to effectively manage EV batteries and other e-waste and to train additional professionals in this field, as required by the MEDD. This will also provide the capacities needed to manage the batteries from the electric 3Ws currently in operation and the additional 3Ws implemented by the project at their end of life; considering that the optimal service lifespan of 3Ws is below 3 years, these capacities will need to be mobilized by the end of the project. Subsequently, the project will choose a partner through an open and competitive process to undertake the collection and management of e-waste in the city for a period of at least 6 months, with a focus on the batteries from end-of-life electric 3Ws. This activity is expected to provide useful lessons to prepare a roadmap to implement a robust e-waste management system in other cities and in the whole country aligned with the expected electrification of the transport sector. The following deliverables are envisaged:

#	Deliverable Description
4.3.1	Market studies and business plans are completed for e-waste management in Toamasina and presented to interested companies.
4?3.2	Two ?train the trainers? workshops on e-waste management are held in Toamasina , with a focus on EV batteries

#	Deliverable Description
4.3.3	At least one e-waste company is selected in Toamasina and support is provided by the project to undertake the collection and management of EV batteries (and other e-waste) for at least 6 months
4.3.4	A report summarizing the results of the e-waste management practice in Toamasina is produced and disseminated
4.3.5	A roadmap for future collection, re-use and recycling and sound disposal of used electric vehicle batteries is finalized and disseminated to all local stakeholders.

Table 29: Deliverables included in output 4.3

Theory of Change

The overall project's Theory of Change (ToC) below provides a visual representation of the project's intervention logic.

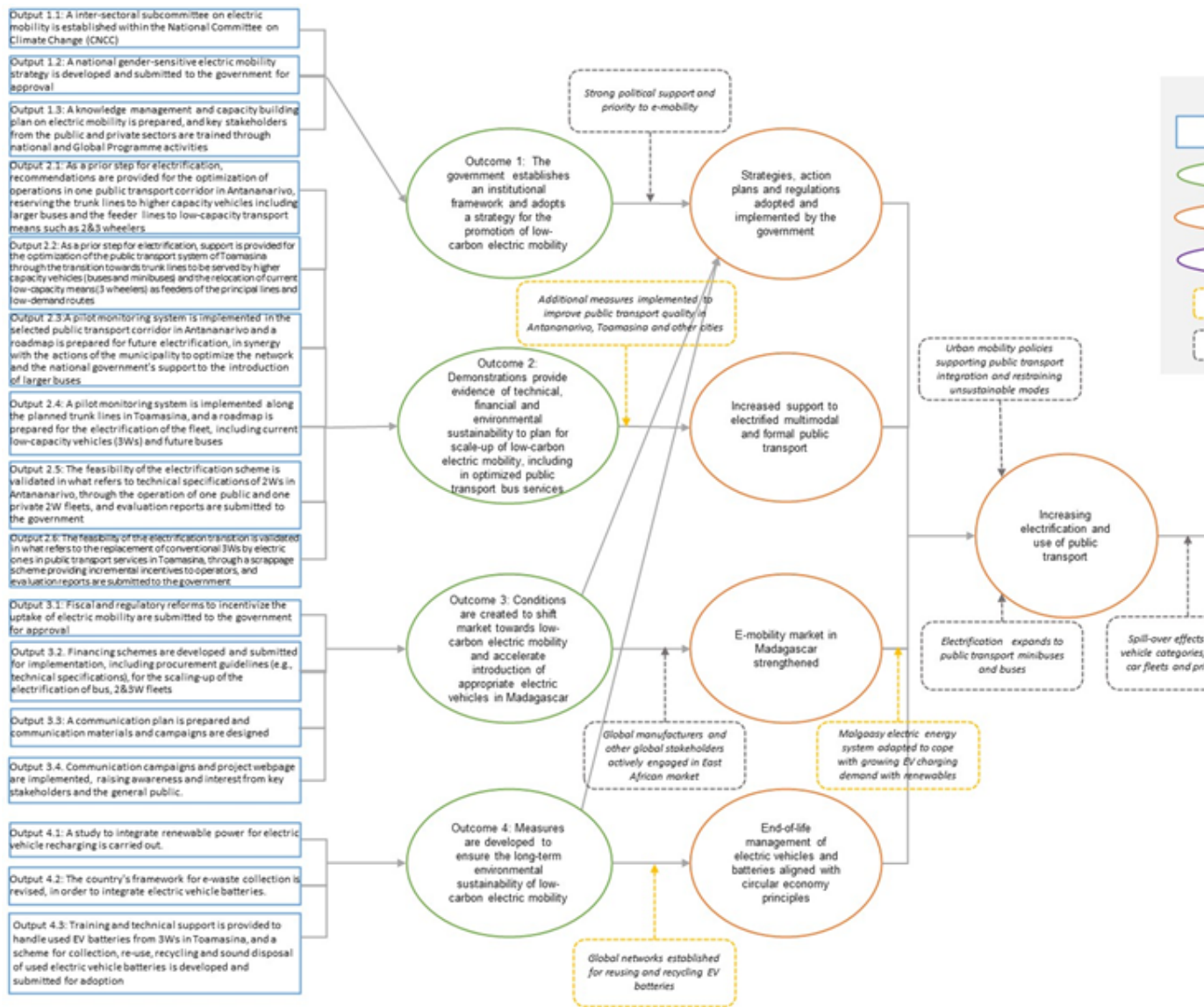


Figure 5: The project's Theory of Change

The key expected result of the project is the reduction of GHG emissions from urban mobility in Madagascar. The outputs included in the four project's components are related to the root causes identified in the problem tree and are crucial to achieve the four outcomes in correspondence with the four barriers (institutional, technical, market-related, and environmental) also identified in the problem tree (Figure 2). The project's expected outcomes facilitate the transition to four intermediate states: the adoption of strategies, action plans and regulations by the government on e-mobility; a strengthened governmental support to electrified multimodal and formal public transport; the consolidation and strengthening of the e-mobility market in Madagascar and the implementation of adequate end-of-life management of the EVs' batteries.

Such intermediate states are possible thanks to the confluence of the project's four expected outcomes with some assumptions and drivers, as described in Figure 5. (1) the project's outcome 1 (the government establishes an institutional framework and adopts a strategy for the promotion of low emission electric mobility) will facilitate the adoption and implementation of the policies, strategies, action plans and regulations delivered by the project, assuming that during the project's life sufficient political support and priority to e-mobility is built up; outcome 3 (conditions are created to shift market towards low-carbon electric mobility and accelerate introduction of appropriate electric vehicles in Madagascar) and outcome 4 (Measures are developed to ensure the long-term environmental sustainability of low-carbon electric mobility) also support the achievement of this intermediate state. (2) the project's outcome 2 (demonstrations provide evidence of technical, financial and environmental sustainability to plan for scale-up of low-carbon electric mobility) is expected to provide wider support to policies aiming at improving public transport services with a focus on electric vehicles; such intermediate state will be facilitated by the implementation of additional measures to improve public transport quality in cities (such as those envisaged in Antananarivo and Toamasina to replace the bus fleet or to reintroduce bus services respectively). (3) The project's outcome 3 (conditions are created to shift market towards low-carbon electric mobility and accelerate introduction of appropriate electric vehicles in Madagascar) strengthens the EV market in Madagascar; on the demand side, the project takes the 2&3W segment as an early adopter and subsequently expands the demand for EVs to corporate and institutional fleets and to regular public transport; on the supply side, the project assumes that, in combination with similar projects in the region, global EV manufacturers will actively engage in offering their models in Madagascar. (4) The project's outcome 4 (measures are developed to ensure the long-term environmental sustainability of low-carbon electric mobility) is expected to result in the application of circular economy principles in the management of electric vehicles and their batteries, assuming that re-use and recycling networks are developed at the global level, so that Madagascar is integrated in such global networks.

The four intermediate states mentioned above are expected to result in a growing electrification of the road fleet, particularly within an improved urban public transport system able to attract a growing number of users and making it unnecessary to rely on the now increasingly popular high-emission solutions, such as old second-hand conventional motorcycles cars. For this to happen, two main drivers will be necessary: the implementation of urban mobility policies prioritizing public transport and the expansion of electrification trends from 3Ws to minibuses and full-size buses. Finally, success in the public transport subsector is expected to encourage vehicle owners, starting with those with larger professional fleets and ending with private car owners, to progressively move towards electric vehicles. This would provide the significant reduction of GHG emissions from urban road transport foreseen by the project.

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

The whole global e-mobility programme and in particular this project are aligned with Objective 1 of the Climate Change Focal Area to "Promote innovation and technology transfer for sustainable energy

break-throughs?, through? CCM 1-2 ? Promote innovation and technology transfer for sustainable energy breakthroughs for electric drive technologies and electric mobility.

By creating a favorable institutional and regulatory framework for sustainable mobility and promoting innovative transport management practices (including EV deployment), the project will contribute to point 112 of the GEF-7 Programming Directions to accelerate ?the speed and scale of sustainable energy investment in developing countries? and to point 113, developing ?innovative business models that go beyond business as usual?.

In addition, the demonstrations on EV operations (for 2&3Ws) are expected to address the short-term barrier due to technical and cultural practices in the transport sector reluctant to innovation, accelerating the transition to low-emission urban mobility. Besides, the project provides long-term sustainability for the adoption of EVs, providing friendlier market conditions and guidance to manage potential environmental hazards generated by transport electrification.

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

GEF funding will provide the necessary resources to accelerate the introduction of electric mobility in Madagascar through the removal of the barriers identified above. GEF funding will strengthen or complement the actions and investments envisaged by the local partners (MEDD, MTM, MEH, and municipalities of Antananarivo and Toamasina) in the promotion of low-carbon development and more specifically in the reduction of fossil fuel dependency and sustainable urban mobility with a decreasing environmental footprint.

Currently EVs are hardly available in Madagascar, and the reduced available income of most of its population, coupled with the limited resources of the national and local governments, all but prevents fleet renewal, so that operators can only afford the purchase of second hand, low capacity vehicles with high maintenance and operational costs and large environmental footprint; on its turn, low vehicle capacity is compensated by a higher number of vehicles on the streets, leading to higher flows and congestion.

The baseline scenario assumes that current national and local governments? efforts will continue in the direction foreseen in official plans and policies, although at a slow pace. Climate policies would continue gaining relevance in the government?s actions, and the profile of the transport sector would increase in the mitigation actions foreseen. Plans for increase the electricity generation capacity based on renewables and to expand the electricity grid would keep gaining momentum as a way to decrease fuel imports and to increased living conditions for the population. The projects and actions envisaged in urban development and transport plans for Antananarivo and other cities, including the president?s priority projects, will be progressively implementing, providing more robust and affordable urban

transportation systems. Similarly, the waste management framework will be modernized, in particular in what refers to the growing challenge of e-waste.

In this context, GEF funding will allow the introduction of electric vehicles as a game changer, offering low maintenance and operating costs to transport operators and fleet managers and therefore contributing to the climate change, energy independence and social cohesion objectives of the national and local governments and exploring options and strategies to dealing with the challenges of availability and cost. The global programme will provide valuable support on this, and the national project will serve to adapt the tools and knowledge generated at the global level to conditions in Madagascar and in some of its cities. The global knowledge management component and the regional platform approach seek to bundle demand in the region and thus reduce the incremental costs (i.e. seeking a cost-effective way of minimizing the incremental costs):

? Generic tools are produced at 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 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;

? 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.

The barrier-removal activities in the project include the preparation of an adequate national strategy and regulatory framework, the preparation of enabling conditions (such as appropriate roadmaps) for sustainable mobility followed by some technical demonstration actions with some key users (urban public transport operators and fleet managers), tackling the availability and financial barriers through tax and customs reforms, governmental incentives and new financial products and the provision of adequate frameworks on end-of-life management.

Regarding co-financing, the project builds upon some closely related initiatives envisaged by a variety of partners:

? Component 1 builds upon the contributions of the three ministries (MEDD, MTM, MEH) to the operation of the CNCC, including its e-mobility subcommittee established by the GEF project, as well as participation in a variety of capacity-building activities related to mobility, renewable energy and climate change mitigation (including those envisaged within the GEF project). Additionally, the MEDD will continue its on-going activities for the preparation of the new NDC, the revision of the PNCC and will prepare the next national communication to the UNFCCC; MTM envisages to undertake the revision and update of some critical parts of the regulatory framework of the transport sector.

? Component 2 builds upon the contributions of the two municipalities involved in the project. In the case of Antananarivo, the municipality envisages to undertake maintenance and upgrade activities in the police depot, which will facilitate the operation of the electric motorcycles involved in the demonstration, as well as strengthening its fleet management capabilities of the police fleet, which will facilitate the monitoring and evaluation activities of this demonstration. Additionally, the MTM envisages to continue with the implementation of the recently presented *Sch?ma directeur des transports ? Antananarivo* (SDT). In Toamasina, the municipality will continue its efforts to improve the registration and licensing services for motorized vehicles and to reinstate regular urban bus services in the city. In both cities, local civil servants will participate in different capacity building activities related to urban mobility, including those organized by the GEF project.

? Component 3 will benefit from the investments in renewable electricity generation undertaken by the MEH, as well as from the active participation of civil servants and authorities from the 3 ministries (MEH, MTM and MEDD) in the different awareness-raising and capacity building activities, and by similar activities in closely-related areas organized by these ministries, such as the MEH's campaigns on energy efficiency and the MEDD's campaigns on environmental preservation and climate change mitigation.

? Component 4 will benefit by ongoing efforts from the MEDD to further develop the regulatory framework on e-waste management and to establish a national waste management plan.

Without the intervention of the GEF, local consumers will not be able to front the higher purchase price, which will ultimately stall the introduction of electric motorcycles in the country. This in turn will lead to the influx of cheaper and polluting conventional motorcycles into the market, which is growing at high annual rates.

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

GHG emission mitigation has been estimated following the GEF 2019 updated Guidelines on Core Indicators and Subindicators^[41]^[41]. Full details are provided in Annex M. Separate estimates have been made for the electrification of 2&3Ws, buses and cars (LDVs). Direct GHG emission reductions are considered only for the lifespan (5 years for 3Ws and 15 years for buses and cars) of the electric vehicles directly provided by the project and from the electric vehicles purchased during the project lifetime as a consequence of the project's policy actions.

An average electricity consumption of 8.7 kWh/100 km for electric 2&3Ws, 100 kWh/100 km for e-buses and 15 kWh/100 km for e-cars has been considered. The average emission factor for electricity

generation in Madagascar (425 kg CO₂e/MWh[42]42 in 2020) is expected to decrease to 117 by 2030, should the government's energy plans (*Nouvelle Politique Energétique*) to expand generation from renewable sources materialize.

Indirect (consequential) emission reductions are estimated considering a reasonable rate of fleet replacement from 2027 on (top-down approach). These additional emission reductions are estimated for a 15-year period after the termination of the project. A causality factor of 60% is used to quantify the amount of the benefits obtained as a result of the project execution and its influences (consequential project benefits), except for the case of 2&3Ws, in which the causality factor is 80%. The project GHG emission reductions and energy saving impacts are summarized in the table below.

GHG reductions and energy savings estimation for Madagascar	
Project information	
? Project duration: 4 years. Starting in 1/2024 and ending in 12/2027	
? Time frame for indirect effects: 15 years. Starting in 1/2024 and ending in 12/2038. (Effects produced by policy developed during the project and coming scale-up projects)	
? Causality factor: 80 % for 3Ws. 40% for buses and LCVs	
Total project emissions reductions, t CO₂	2,502,433
Total direct emission mitigation from demonstration projects, t CO₂	751,063
<i>Primary direct emission mitigation from demonstration</i>	876
Buses, with a lifespan of 15 years	-
LDVs, with a lifespan of 15 years	-
2&3Ws, with a lifespan of 5 years	876
<i>Secondary direct emission mitigation (policy measures)</i>	750,187
Buses, with a lifespan of 15 years	561,770
LDVs, with a lifespan of 15 years	75,081
2&3Ws, with a lifespan of 5 years	113,336
Total indirect emission mitigation, t CO₂	1,751,370
Bus fleet (causality factor 40%)	1,310,797

GHG reductions and energy savings estimation for Madagascar	
LDV fleet (causality factor 40%)	175,189
2&3Ws fleet (causality factor 80%)	265,385
Total project energy savings, MJ	31,363,304,648
Total direct energy savings from demonstration projects, MJ	9,412,662,675
<i>Primary direct energy savings from demonstration</i>	<i>9,661,264</i>
Buses, with a lifespan of 15 years	-
LDVs, with a lifespan of 15 years	-
2&3Ws, with a lifespan of 5 years	9,661,264
<i>Secondary direct energy savings (policy measures)</i>	<i>9,403,001,411</i>
Buses, with a lifespan of 15 years	7,285,386,493
LDVs, with a lifespan of 15 years	868,123,583
2&3Ws, with a lifespan of 5 years	1,249,491,335
Total indirect energy savings, MJ	21,950,641,973
Bus fleet (causality factor 40%)	16,999,235,151
LDV fleet (causality factor 40%)	2,025,621,692
2&3Ws fleet (causality factor 80%)	2,925,785,130

Table 30: Summary of Project's Expected GHG Emission and Energy Reductions

7) Innovativeness, sustainability and potential for scaling up

Innovativeness:

The innovative nature of the project deliverables can be found at various levels:

Technical, related to the innovative nature of the e-mobility solutions to be implemented in Madagascar:

? The operation of electric 2 and 3 wheelers is just starting in East Africa, including Madagascar, and although a few electric 3Ws are operating in Toamasina, their technology is far from optimal.

? Additionally, there is no availability of public charging infrastructure and the implementation of off-grid electricity systems is still at the initial stages. Their use for vehicle charging will be an innovation with a strong potential for replication throughout the country. The comparison of the viability and advantages of alternative charging systems (battery swapping or fixed batteries) for the project's demonstration will guide future users in the selection of the most suitable option in accordance with their needs.

? The introduction of electric vehicles is coupled with building capacity in the fleet management area as a way to maximize the impact of the new technology and also to facilitate the replication of sustainable fleet management practices even among those operators that have not decided to electrify their fleets yet.

Social, related to the potential improvement of the quality of public transport services in cities.

? The operation of electric 3Ws in coordination with the expected reintroduction of bus lines is also an innovation in public transport operations in Toamasina. Thus far, 3Ws have replaced bus services and have been poorly supervised, increasing congestion and road accidents; the project will empower the municipality with technical capacities and tools to properly manage the public transport system.

? The project is also expected to provide innovative contributions referring to the upgrading of urban public transport systems through the introduction of higher capacity buses and optimized bus line networks. This is a necessary precondition for the subsequent electrification of the urban bus fleets, and the project will provide guidance to the municipalities of Antananarivo and Toamasina, and to the MTM to address this challenge, and to establish a fair redistribution of financial and operational risks among transport operators, vehicles' owners and public authorities.

Business innovativeness, facilitating the access of fleet owners to the advantages offered by electrification.

? The introduction of electric 2W in the municipal fleet of Antananarivo, coupled with the introduction of fleet management systems, will provide a valuable reference to a variety of fleet managers in the public and private sectors to optimize operations and to consider the advantages of electrifying their fleets.

? The business models and finance schemes to introduce electric vehicles in different fleets are also innovative in Madagascar and have strong potential to provide useful guidance to other low-income countries. The project's business models will empower investors and transport operators to adopt better decisions in the procurement and operation of their fleets. The local financial industry will be provided

with factual-based and reliable information on electric technologies and their costs and will be able to better tailor their lending policies to the technical and economic characteristics of electric mobility and to the profiles of a variety of fleet owners.

? The project provides new industrial and business opportunities, through training for the local assembly of electric vehicles, starting with 2Ws and 3Ws and the provision of recharging services, including battery swapping. (Training materials prepared in output 1.3, deliverable 1.3.4 and professional training delivered in output 2.6)

Environmental, supporting the country in setting-up adequate ELV management procedures and benefiting from synergies between electrification and off-grid renewables.

? Due to the limited availability of electricity in Madagascar, the coordinated expansion of transport electrification and off-grid renewables is another significant contribution of the project, encouraging stronger cooperation between the transport and energy sectors. Such approach is also innovative at the global level and will serve to assess in more detail the synergies among e-mobility and renewables, including the role that used batteries can play in renewable off-grid infrastructure.

? The project's expected deliverables on ELV management, with a focus on battery re-use, recycling and safe disposal is a significant novelty in Madagascar and in the East Africa region, where the potential for modernization of waste management systems is significant. It can also provide useful lessons at the global level, offering guidance on how to integrate low-income countries within the global management chains that are now starting to emerge.

Governance, establishing stronger cooperation among government departments, and between the national government and the two participating municipalities.

Environmental Sustainability

This project intends to significantly reduce GHG emissions from the transport sector in Madagascar. Its potential to deliver the intended GHG emission reduction relies on the project's ability to kick off a growing market for electric vehicles. The prospects for the energy system in Madagascar indicate that electricity will increasingly be dominated

by renewable sources, so that the average GHG emissions per MWh generated should dramatically decrease in the next years from the already low 243 kg CO_{2e}/MWh estimated by IRENA for 2020[43]⁴³. This will make the replacement of conventional vehicles by electric ones highly advantageous in terms of GHG emission reduction.

From a waste management perspective, the project actively contributes to addressing the currently unsustainable patterns in the management of electric waste and end-of-life vehicles. By doing so, the

expansion of electric vehicles should not become the source of additional environmental hazards. The project undertakes an integrated approach,

not limiting itself only to end-of-life electric vehicles and their batteries, but inserting their management within a more general framework, as otherwise this would create an additional barrier to EVs compared to conventional vehicles.

Several project design elements are expected to facilitate the endurance of the outcomes beyond the project's lifespan:

? The creation of a coordination body, possibly in the form of a national e-mobility subcommittee within the CNCC (output 1.1) will help coordinate sectoral policies and establish synergies among sectoral projects and facilitate the removal of bureaucratic barriers and the consolidation of comprehensive approaches. This will help maximize the impact in both private and public investments and activities.

? The national gender-sensitive e-mobility strategy (output 1.2), supported by a multi-stakeholder consultation and communication plan (output 1.4) will help steer the transition to electric mobility, ensuring the political buy-in for the project and identifying social aspects of the deployment, thus guaranteeing that the expansion of EVs in the country does not have negative impacts on vulnerable groups in the community. This will be further strengthened by communication campaigns providing the project's results and disseminating its technical materials (outputs 3.3 and 3.4).

? Capacity building activities will ensure that capacity, knowledge and experience is transferred to the public administrations and private stakeholders (and not only to the participating individuals from these institutions) through the training activities of the Global Programme (output 1.3) and the materials and workshops provided by the GEF project (outputs 2.5, -2.6 and 4.3).

? Demonstrations (Component 2, in particular outputs 2.5. and 2.6) and the development of business models and financial schemes (output 3.2) will empower the more dynamic car dealers and importers to include a growing number of electric vehicles in their commercial offer, facilitating access to the technology to users better positioned to benefit of electric vehicles.

? Regulatory reforms (output 3.1) will incentive the uptake of electric vehicles and the phasing out of obsolete highly emitting conventional vehicles, making low-carbon motorized mobility more competitive. In particular, policy reforms related to electric vehicle charging infrastructure will support the development of infrastructure that can support the growing demand for electric vehicles and its associated charging stations, thus ensuring that market development goes beyond vehicle development to also include its supporting ecosystem.

? By creating a regulation (and a mechanism) for the disposal of electric vehicles' batteries and e-waste (outputs 4.2 and 4.3), the project will reduce the environmental hazard associated to the disposal of electric vehicles at their end of life.

? The recommendations to integrate renewable power (in particular off-grid solutions) with the recharging systems for EVs (output 4.1) is expected to accelerate the introduction of EVs by coupling it with the expansion of renewables in electricity generation, including off-grid facilities.

Sustainability of market development after the project:

Through the Africa Platform set up by the Global Programme and the cooperation with International Financial Institutions, it is envisaged that the project will lead to the un-locking of resources to fund financial mechanisms to upscale the EV market in Madagascar for large and medium-sized fleets. The Africa Platform will be operational beyond the lifetime of the Madagascar e-mobility project and is anticipated to be the leading marketplace in Africa where potential project concepts meet potential financiers and potential technology suppliers. It is hence anticipated that the GEF project will lay the ground for a transformational shift towards electric mobility in Madagascar. It is the aim of the project to create an understanding that the use of electric vehicles is the most economical option in many fleets, including public transport, governmental fleets and private fleets. Together with the adoption and deployment of an adequate financial mechanisms, the market will progressively move towards large-scale adoption of electric vehicles in the 2W, 3W, urban bus and car segments.

-

Potential for scaling-up:

At the end of the project, it is expected that the Malgache market will provide consumers with a growing variety of electric vehicles with reliable maintenance services, and that the government will have consolidated a friendly regulatory framework for electrification. Additionally, it is expected a significant expansion in access to electricity- including alternative off-grid options- based on renewables.

The continuation of Madagascar's transition towards sustainable mobility and electrification beyond the project strongly builds upon the Global E-mobility Programme strategy outlined in Figure 4. It provides technical evidence and information, and an enabling regulatory and policy environment for dynamic public and private stakeholders to access to feasible electrification options. The project sees itself as a preparatory stage to pave the way to the subsequent action of the World Bank and other IFI to promote sustainable mobility at the local and national levels. The following project's elements are particularly relevant to facilitate the scaling-up of its outcomes:

? Managers of large and medium public and private fleets (starting by those providing urban transport services) are expected to become keenly interested in including electric vehicles into their fleets, due to barrier removal provided by the project, the increased availability of electric vehicles in the country, and further technological de-risking through capacity building. As the up-front investment required is reduced by technological progress, financial schemes and public incentives, a growing number of fleets will be able to include EVs. This should help reduce the risk of early adopters and promote the development of the electric vehicle market in Madagascar.

? The exemplary role of the 2W and 3W segments in demonstrating the feasibility of their electrification will raise awareness, particularly among 2W and 3W fleet managers (in the urban logistics sector) and urban transport managers, including bus operators. It will also increase the public's demand for cleaner vehicles in cities the rest of the economy ? including other private activities and the public sector.

? The involvement of a wide variety of stakeholders in the project and specially in the different capacity building activities will help identify emerging business opportunities linked to e-mobility, such as vehicle assemblage, maintenance and charging services.

? In addition to the pilot projects, which will help build confidence on the capabilities of the technology, the creation of financial schemes for the acquisition of electric vehicles and business models to optimize their operation will improve the general business environment that includes car dealers, leasing and renting companies, financing institutions, insurance companies and service providers. The growth of the latter will help consolidate investments and promote the scaling-up of the entire sector.

? The data collected throughout the pilot project will allow the development of business models to support existing companies (car dealers, maintenance workshops, waste management companies, last-mile and micro-logistic fleet operators) and new entrepreneurs to competitively operate in this emerging market and benefit from its associated business opportunities.

[1] CO2 Emissions from Fuel Combustion Highlights (2019 edition), IEA 2019

[2] International Energy Agency (IEA) Mobility Model 2017

[3] International Transport Forum (ITF) Transport Outlook, 2017

[4] Source: INSTAT (2020). ?R?sultats globaux du recensement g?n?ral de la population et de l'habitation de 2018 de Madagascar.

[5] <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?view=chart>

[6] Combining energy generation from solar and fossil sources

[7] International Renewable Energy Agency (IRENA). Country Profile. Madagascar.
https://www.irena.org/IRENADocuments/Statistical_Profiles/Africa/Madagascar_Africa_RE_SP.pdf

[8] MEH(2015). *Nouvelle Politique ?nerg?tique (NPE)*.

[9] Solar energy accounts for less than 1% of total generation and is not included in JIRAMA's statistics.

[10] Antetetzambato (142 MW), Sahofika (Phase 2, 95 MW), Ranomafana, (64 MW), Antafofo (160 MW), Lohavanana (120 MW),

Mahavola (300 MW), Talaviana (21 MW), Tsinjoarivo (21 MW), Namorona 2 (12 MW), Fanovana (9,2 MW), Ankelimahery ? Mahitsy 2 (15,1 MW), Ambodiroka (42 MW), Bevory (16,2 MW), Lokoho (6 MW), Andranomamofona (15 MW).

[11] The expansion of Ambatolampy and the Mahitsy plant have been opened in the first half of 2022. The 4th group of Andelaleka is still under construction and expected to be operational in 2023.

[12] www.climantewatchdata.org

[13]

<https://wedocs.unep.org/handle/20.500.11822/20502;jsessionid=6A98DE57E379C666516C601F97B5FE93>

[14] Madagascar Third National Communication, p.16-17.

[15] Such as the *Sch?ma Directeur du Transport dans la ville d'Antananarivo* (SDT), recently completed by the MTM.

[16] As stated in the Third National Communication.

[17] Wits.worldbank.org. World Bank (2019). Madagascar Economic Update: Managing Fuel Pricing.

[18] In the past, Antananarivo benefited from a cooperation project by *R?gion ?le-de-France* through *Institut des Metiers de la Ville* between 2009 and 2015, addressing the improvement of the public transport system and CODATU launched some cooperation activities , but these initiatives did not result in the implementation of concrete actions.

[19] <https://www.banquemondiale.org/fr/country/madagascar/overview#1>

[20] <https://population.un.org/wup/Country-Profiles/>

[21] Government of Madagascar (2015). Habitat III National Report. <https://habitat3.org/wp-content/uploads/Madagascar-English-National-Report-V1.1-Lite.pdf>

[22] Banque Mondiale (2022). Vers un transport urbain efficace, durable et s?r ? Madagascar. Rapport de synth?se.

[23] MEH (2019). Bilan ?nergetique national 2017.

[24] However, the WB estimated in 2019 that JIRAMA provided only 50% of the total generation (although no detailed data is included in the WB?s document) and AfDB estimated it at 70% for 2016. See WB (2019). Least-Cost Electricity Access Development Project ? LEAD. Project Appraisal Document. See AfDB (2019). Mini-Grid Market Opportunity Assessment: Madagascar. This is consistent with the 2017 figures on installed power (only 315 MW of a total of 699 MW would be in

JIRAMA's hands) provided in AfDB (2017). *Projet de renforcement et d'interconnexion des réseaux de transport d'énergie électrique ? Madagascar (PRIRTEM) : Mécanisme de financement de la préparation du projet (PPF)*.

[25] INSTAT National Statistics (no information on generation from producers other than JIRAMA).

[26] See WB (2019). *Least-Cost Electricity Access Development Project ? LEAD. Project Appraisal Document*.

[27] <https://www.get-invest.eu/market-information/madagascar/energy-sector/>

[28] Tariffs last approved by ORE in June 2021. These tariffs apply to Zone 1 (which includes Antananarivo and Toamasina); for households, the tariff for power < 3.3 kW and for consumption between 130 and 300 kWh/month is considered. <http://www.ore.mg/DonneesTechniques/Tarifs.html>. Exchange rates as of June 2021.

[29] Actual implementation started in 2020. Total project costs are almost USD 200 million, of which USD 105 million are financed through already approved (in 2019 and 2020) loans by AfDB and EIB, and almost USD 56 million by a South Korea loan (approved in 2022).

[30] UA is the unit of account of the AfDB. 1 UA = 1.3411 USD (as of December 2022).

[31] This was accompanied by a *Lettre de politique de l'énergie de Madagascar 2015-2030* (September 2015, providing a summary of the NPE).

[32] This plant was inaugurated in December 2022.

[33] Works concluded in December 2022. Currently under testing.

[34] Financing agreement signed with the French Government in September 2022.

[35] Completed in April 2022.

[36] The updated PNLCC is prepared with the support of Climatlas and the Friedrich Ebert Stiftung.

[37] Reducing emissions from deforestation and forest degradation.

[38] Including the recent report of the World Bank (2022). *Vers un transport urbain efficace, durable et sûr ? Madagascar : Antananarivo et autres grandes villes*.

[39] Electricity and Water Utility of Madagascar.

[40] *Global Electric Vehicle Outlook 2022*, International Energy Agency

[41] https://wwfgeftracks.com/sites/default/files/2019-04/indicators_0.pdf

[42] Considering 44% of electricity from hydroelectric generation, 55% from thermal generation and 1% from solar plants. This is consistent with the figures provided by <https://lowcarbonpower.org/region/Madagascar>: between 325.7 and 477.9 kg CO₂e/MWh in 2020.

[43]

https://www.irena.org/IRENADocuments/Statistical_Profiles/Africa/Madagascar_Africa_RE_SP.pdf

1b. Project Map and Coordinates

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

Madagascar is an island nation off the southeast coast of Africa, 400 km east from the Mozambique coast. Madagascar has an area of 587,295 km² and as of 2018 had a population of about 25 million inhabitants of which 35% live in urban areas and 77% in rural areas.

About 4 million of Madagascar's population reside in the economic and political capital city of Antananarivo, located in the mountainous Central Highlands region of Madagascar. Toamasina, is the second largest city in Madagascar with 326,286 inhabitants; it lies along the Indian Ocean, in the Eastern coast of the island. Toamasina is Madagascar's commercial hub and foremost port, handling much of the island's foreign trade.



Figure 6 : Location of the demonstration sites

Targeted cities	Latitude	Longitude
Antananarivo	18.8792° S	47.5079° E
Toamasina	18.1443° S	49.3958° E

Table 31: Coordinates of the demonstration sites

1c. Child Project?

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

The current project is hosted under the 'Global Programme to Support Countries with the Shift to Electric Mobility', led by UNEP.

The Global Programme is based on the following four 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 CO2) mitigated			
Indicator B: Direct and Indirect energy 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 uptake of electric mobility	Outcome 4 Projects and electric mobility markets are tracked, 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 committed 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	

Figure 7: Global E-mobility Programme Monitoring Framework

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, the Ministry of Environment and Sustainable Development of Madagascar 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 led by 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.



Figure 8: The relationship among the global, regional and national projects in the UNEP programme

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

- ? The creation of a community of practice for the GEF 7 regional countries;
- ? Facilitation of knowledge transfer between countries, and regions, especially those with common characteristics like SIDS;
- ? The creation of thematic groups in light-duty vehicles (LDVs), 2-3 wheelers, and buses at regional level;
- ? A marketplace between countries, technology providers and financial institutions;
- ? Help desk for technical assistance to GEF 7 countries;
- ? Personalized assistance from international experts in electric mobility;
- ? 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 Stakeholder Engagement Plan (SEP) presented in this section is designed to ensure effective engagement of all relevant stakeholders throughout the project lifecycle in Madagascar. It builds upon the information collected in the interviews and virtual and on-site workshops conducted during the design stage. The project intends to maintain a fluid two-way dialogue with the relevant national and local government institutions and agencies, the private sector, and civil society, as well as with local and international NGOs, the international community and other participating countries at the global programme level.

Legal requirements for public consultation in Madagascar

There are few legal requirements for public consultation in Madagascar. The more relevant ones are included in the Charte de l'Environnement (Loi n° 2015/-003 portant code de l'environnement, du 30 juin 2000), in what refers to environmental impact assessments and strategic environmental assessments. This law (article 7) also enshrines the right of access to any information related to potential impacts on the environment. This can be understood as a general recognition of the principle of public consultation, even if this principle is not further developed in the relevant sectoral legislation.

For this project, public consultation will follow the GEF Guidelines, which require that all GEF-funded projects meet best international practice and specifically the requirements for stakeholder engagement and public consultations. The project stakeholder engagement activities will be robust, including disclosure of all project-related information in order to promote better awareness and understanding of its strategies, policies and operations. During disclosure, the project will: (1) identify people or communities that are or could be affected by the project as well as other interested parties; (2) ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them, through a process of information disclosure and meaningful consultation; and (3) maintain a constructive relationship with stakeholders on an on-going basis through meaningful engagement during project implementation. The stakeholder consultations will take place along the whole project life and will ensure that stakeholders are informed about environmental and social consequences of the project implementation and that they have adequate channels to provide their feedback.

The project foresees the preparation of a consultation strategy. This document will provide precise guidance to undertake the consultation procedures, with a focus on the policies, plans and regulatory reforms to be developed by the project, before submission to the relevant authorities.

Identification of stakeholders for engagement and methods of communication

In order to ensure inclusive participation and consultation, the following stakeholders have been identified for consultation. The list includes the social groups that are associated with the project in different ways: those directly or indirectly engaged in the outcomes of project implementation; those directly or indirectly participating in the project, and those with a capacity to influence and decide on project implementation and outcomes.

? National government. The Ministry of Environment, and Sustainable Development (MEDD, mainly through its BNCCREDD+), the Ministry of Transport and Meteorology (MTM), the Ministry of Energy and Hydrocarbons (MEH) and the Ministry of Finance (MoF, through its Revenue Office, mainly in what refers to fiscal incentives the facilitation of EV imports). The Ministry of Population, Social Protection and Promotion of Women (MPPSPF), mainly through its Directorate for Gender Promotion and the gender focal points established at each Ministry. Other ministries may be interested in participating in particular project activities, such as those addressing urban road design, which could be of interest for the Ministry of Public Works (MTP), or the demonstrations in Antananarivo and Toamasina, which could be of interest for the services in charge of the presidency's priority projects (*Direction G?n?ral de la Pr?sidence de la R?publique de Madagascar en charge des Projets Pr?sidentiels*).

? National regulators and public companies. JIRAMA (the public utility for water and electricity) is the vertically integrated company for production, transmission, and distribution of electricity. JIRAMA is expected to play a key role in the development and implementation of the national e-mobility strategy, the deployment of public charging stations and the promotion of e-mobility. There is also a Rural Electrification Agency (ADER), mainly involved in off-grid projects. Regulation and control remain in the hands of the MEH in the energy sector and the MTM in the transport sector.

? The municipalities of Antananarivo and Toamasina are engaged in the improvement of urban mobility, with different initiatives to improve the public transport system with the support of the national government. For example, in Antananarivo, the national government has announced the importation of full-size buses and its delivery to bus operators at a subsidized price, and in Toamasina the municipality is actively seeking for options to reintroduce bus services in the main lines currently served by 3Ws.

? Associations of public transport providers. There are different associations of public transport operators, like UCTU (Union des Coopératives de Transport Urbain) and FMA (Fédération Malgache des Associations de Transporteurs) in Antananarivo, where 3W operators in Toamasina are more loosely organized along the corridors they deserve.

? Civil Society Organizations. This includes a variety of organizations. The most relevant ones are the CNFM (*Conseil national de femmes de Madagascar*), an umbrella organization established in 2010 and affiliated to the International Council of Women (ICW), which includes most CSOs active in women rights in Madagascar; CNFM is actively engaged in different public policy areas in Madagascar in order to strengthen women's engagement in the decision making process and to better take into consideration women's priorities in policy design. Institut IH is an NGO active in Madagascar for more than 30 years, and working, inter alia, in the integration of persons with reduced mobility (PRM); its engagement in the project could facilitate the consideration of PRM's needs in the development of e-mobility in Madagascar and in the improvement of public transport services in Antananarivo and Toamasina. At the regional level a number of specialized NGOs are expected to be engaged, such as Sustainable Transport Africa, which is already present in other countries in the region, but not in Madagascar yet; are associated within. There are also NGOs active in sustainable mobility and electrification at the regional and subregional levels: Sustainable Transport Africa is an NGO based in Kenya with the primary objective of making transport more accessible to the lower income, physically challenged and financially disadvantaged groups, while reducing the adverse environmental and health impact. It is already cooperating with UNEP in e-mobility projects in other African countries and could also be associated to project in Madagascar.

? The financial sector is a key project partner to facilitate the access of operators to EVs and have been invited to join the project's activities. Key financial stakeholders in Madagascar include BOA Madagascar (a member of the Bank of Africa group), National Industrial Bank (*Banque Nationale de l'Industrie*), Malagasy General Society (*Société Générale Madagasikara*, a member of Société Générale group) and Malagasy Bank of the Indian Ocean (*Banque Malgache de l'Océan Indien*, a member of the French group BPCE) all of them private. The Malagasy Mutual Insurance MAMA (*Mutuelle d'Assurance Malagasy*), a public institution with a significant share of the vehicle insurance business, will also be engaged in project activities, open also to the other companies active in this

sector (Sham, Allianz, Ny Havana, ARO). As EVs provide a substantial reduction in operating costs in exchange of higher upfront capital costs, they offer a significant business opportunity to the financial sector to develop appropriate loans, leasing and insurance schemes.

? Industrial stakeholders are essential for the deployment of EVs in Madagascar. The project will offer them an opportunity to enter a promising market, and will provide a reliable assessment of the market prospects. Local vehicle dealers such as Madauto, Sakaiza and SAS Electric Motor have participated at the project design process. There are also a number of industrial stakeholders active in the East Africa region and with an interest in participating in the project: some regional motorcycle manufacturers are developing electric models (Ampersand Rwanda, Kibo Africa Limited, Auto-Truck East Africa, Opibus Kenya Limited, Solar E-Cycles Kenya Limited, Bodawerk Uganda Limited).

? The contribution of industrial stakeholders will also be valuable for setting up an adequate framework for the collection and management of EV batteries. Besides the contribution of the local vehicle dealers and regional motorcycle manufacturers mentioned above, it is expected to mobilize recycling companies already active in the e-waste subsector. Due to the characteristics of the subsector, these companies could not be directly approached during the project design stage, and will be contacted and mobilized during project implementation.

? Public and private managers of large car fleets are the key stakeholders targeted by the project for its demonstration and upscaling activities. They include the GoMG central services, JIRAMA, and large private companies such as Orange Madagascar.

? The higher education system in Madagascar includes the University of Antananarivo and the *Institut Sup?rieur de Technologie d'Antananarivo (IST)*, offering education on Civil Engineering and transport and logistics management, among others. This academic institution is keen in participating in the project, providing its knowledge and looking for upcoming challenges to accommodate e-mobility technologies within its curricula and research agendas.

The stakeholders' ownership of the project is essential for its success. The project was developed in close consultation with MEDD (GEF Focal Point for Madagascar) as well as with the MEH and MTM, including regular teleconferences with representatives from the three ministries. During its planning stage, UNEP and MEDD organized a scoping virtual workshop on February 22nd, 2022 with 25 participants (44% women). It included presentations from MEDD, MTM and MEH on their current policies in the fields of climate change, public transport and energy (with a focus on renewables) and presentations from UNEP on the Global E-mobility Programme and the key elements of the child project in Madagascar (its objective to accelerate the introduction of e-mobility in the country, the GEF budget and the project's approach (theory of change including the 4 main components). The workshop participants recommended, inter alia, to address the need to discourage the importation of polluting second-hand vehicles, the need to support the modernization of public transport systems in the participating cities, and the need to accelerate to the extent possible the implementation of the demonstrations.

A project design mission was completed on August 1-5th, 2022, including a design workshop on August 4th with 59 participants (36% women) representing a wide array of stakeholders. The mission

included in person or virtual interviews with the main stakeholders (MEDD, MTM, MEH, municipalities of Antananarivo and Toamasina, public transport associations and vehicle dealers as well as with some of the donors and institutions active in the country (including the EU and the various institutions of the UN system) and one gender association. The workshop included presentations from MEDD, MTM, MEH and the municipalities of Antananarivo and Toamasina on challenges and current policies in the areas urban mobility, renewables and climate change, and their expectations from the project. The draft structure of the project (including components and outputs, distribution of resources and governance) was discussed as well as the social, environmental and gender challenges and their integration within the project. The participants noticed that the preparation and approval of any regulatory changes is likely to take a long time in Madagascar, and that the activities addressing these issues should therefore be started as early as possible. They also stated that there are strong barriers to the integration of women in the transport sector, partly associated to a perception of insecurity and violence, that should be considered during project implementation. They also underlined the economic development opportunities associated to the introduction of e-mobility, if vehicle assemblage (and in future even manufacturing) could be done locally, and that the project could contribute to this through capacity-building activities.

Additional bilateral on-line interviews, with a focus on the participating municipalities were held in the September- October 2022 period in order to better fit the demonstrations to their concerns and priorities.

A final mission was completed on December 12-14th, 2022, including a validation workshop on December 13th with about 30 participants (15 % women). During the validation workshop, participants had the opportunity to review the main components of the draft CEO ER, including the project logframe, the results framework with indicators and targets, the budget distribution by component and output and the workplan summary. Participants also reviewed the project organigram, the responsibilities of the main stakeholders and an estimate of the staff and consultants that would be mobilized for implementation. A French summary with the project information was distributed ahead of the meeting to facilitate the discussion. Participants of both demonstration cities attended the workshop and a bilateral meeting was held with the Director of the Cabinet of the Municipality of Antananarivo. In addition, a bilateral meeting with Ministry of Energy and Hydrocarbons was held to agree on their co-financing contribution.

As a result, the project has included appropriate responsive measures throughout its lifespan to consolidate and maintain the wide current support built up during the planning stage. The existing activities already undertaken or envisaged by key stakeholders are identified in the table below. Based on this information, their potential contributions to the project components are also identified.

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Contributions to the project
National Government	MEDD (Ministry of Environment and Sustainable Development)	<p>Update and implementation of the National Plan on Climate Change and new NDC and National Communication.</p> <p>Preparation and implementation of the National Waste Management Plan.</p>	<p>Component 1: e-mobility strategy, coordination platform, training activities.</p> <p>Component 2: monitoring of demonstrations</p> <p>Component 3: development of business models</p> <p>Component 4: End-of-life management of EVs and their batteries</p>
	MTM (Ministry of Transport and Meteorology)	Implementation of the SDT of Antananarivo. Reform of the regulatory framework for transport services.	<p>Component 1: e-mobility strategy, coordination platform, training activities.</p> <p>Component 2: support to the implementation of the charging infrastructure as part of the demonstration</p> <p>Component 3: Development of business models and financial schemes, new regulatory framework for 2 and 3 wheelers.</p>
	MEH (Ministry of Energy and Hydrocarbons)	Completion of various infrastructure projects for renewable electricity generation and distribution.	<p>Component 1: e-mobility strategy, coordination platform, training activities.</p> <p>Component 3: Development of business models and financial schemes.</p>
	MEF (Ministry of Economy and Finance)	Preparation of National Budget	<p>Component 1: e-mobility strategy, coordination platform.</p> <p>Component 3: Fiscal policies and regulatory schemes on e-mobility; Development of business models and financial schemes.</p>

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Contributions to the project
	MEH, Electricity Regulatory Board (ORE)	Technical regulations on the operation of electricity grids	Component 1: e-mobility strategy, coordination platform, training activities. Component 4: integration of e-mobility with the deployment of renewables
	MPPSPF (Ministry of Population, Social Protection and Women's Promotion)	Update and Implementation of the National Gender Plan 2012-2025 (NGP). On-going activities its Directorate for Gender Promotion and the gender focal points at each Ministry	Component 1: e-mobility strategy, coordination platform, training activities. Component 2: gender aspects in the design of the demonstrations Component 3: Development of business models and financial schemes prioritizing women's engagement
	DGPP Directorate General for Presidential Projects	Planning and implementation of new urban transport infrastructure in Antananarivo	Component 2: optimization and integration of public transport services in Antananarivo.
	MTP (Ministry of Public Works)	Land use, urban and regional planning	Component 1: e-mobility strategy, coordination platform
Public Sector	JIRAMA Electricity and Water Utility	Investment in renewable electricity generation. Optimization of their fleet management practices	Component 1: e-mobility strategy Component 2: support to the implementation of the charging infrastructure as part of the demonstration Component 3: Development of business and financial models.

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Contributions to the project
	ADER (Rural Electrification Agency, <i>Agence de Développement de l'Électrification Rurale</i>)	Investment in off-grid renewable electricity generation	<p>Component 1: e-mobility strategy</p> <p>Component 2: support to the implementation of the charging infrastructure as part of the demonstration</p> <p>Component 3: Development of business and financial models.</p> <p>Component 4: integration of e-mobility with the deployment of renewables (off-grid applications)</p>
	ATT (Administration for Inland Transport)	Improvements in the provision of metropolitan (interurban) bus services	<p>Component 2: Demonstrations</p> <p>Component 3: Development of business and financial models on electrification of transport sector</p>
Local Gov.	CUA (Municipality of Antananarivo)	Implementation of PUDi and Vision 2040	<p>Component 1: E-mobility sub-committee (as an observer invited to relevant meetings)</p> <p>Component 2: Demonstrations</p>
	CUT (Municipality of Toamasina)	Implementation of PUDi	<p>Component 1: E-mobility sub-committee (as an observer invited to relevant meetings)</p> <p>Component 2: Demonstrations</p> <p>Component 4: End-of-life management of EVs and their batteries</p>
Public Transport Associations	UCTU (Union of Cooperatives of Urban Transport)	General support to its associates (minibus and bus drivers)	<p>Component 2: design of demonstrations, validation of results</p> <p>Component 3: Business models and financial schemes on electrification of transport sector</p> <p>Component 4: business models on ELV management</p>

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Contributions to the project
	FMA (Coordinated Transportation for Antananarivo)	General support to its associates (3W drivers)	Component 2: design of demonstrations, professional training on electric 3Ws; validation of results Component 3: Business models and financial schemes on electrification of transport sector; new regulatory framework for 2 and 3 wheelers.
	3W operators in Toamasina: Soci?t? JADYS, Speedy Tuk Tuk, Gasmis, Trimoto ?	General support to its associates (2W drivers)	Component 2: design of demonstrations, professional training on electric 3Ws; validation of results Component 3: Business models and financial schemes; new regulatory framework for 2 and 3 wheelers.
Civil Society Organizations	CNFM (National Women's Council)	Gender perspective in public policies	Member of the PSC Component 1: e-mobility strategy Component 2: design of demonstrations; validation of results
	Institut HI	PMR perspective in urban mobility	Component 1: e-mobility strategy Component 2: design of demonstrations; validation of results
Private financial sector	BOA Madagascar	Vehicle loans to transport operators and corporations	Component 3: Business models and financial schemes on electrification. Component 4: Business models and financial schemes on ELV management
	Banque Nationale de l'Industrie	Vehicle loans to transport operators and corporations	Component 3: Business models and financial schemes on electrification. Component 4: Business models and financial schemes on ELV management
	Soci?t? Gn?rale Madagasikara	Vehicle loans to transport operators and corporations	Component 3: Business models and financial schemes on electrification. Component 4: Business models and financial schemes on ELV management

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Contributions to the project
	Banque Malgache de l'océan Indien	Vehicle loans to transport operators and corporations	<p>Component 3: Business models and financial schemes on electrification.</p> <p>Component 4: Business models and financial schemes on ELV management</p>
	Assurance MAMA (Mutual Insurance MAMA)	Vehicle insurance better tailored to the urban public transport sector	<p>Component 3: Business models and financial schemes on electrification.</p> <p>Component 4: Business models and financial schemes on ELV management</p>
Industrial sector, local	Sakaiza and SAS Electric Motor	Import and assembling of electric 3Ws	<p>Component 2: Demonstration.</p> <p>Component 3: Fiscal policies and regulatory schemes on e-mobility; Development of business models and financial schemes.</p> <p>Component 4: Business models and financial schemes on ELV management</p>
	Madauto	Main vehicle importer	<p>Component 3: Fiscal policies and regulatory schemes on e-mobility; Development of business models and financial schemes.</p> <p>Component 4: Business models and financial schemes on ELV management</p>
	To be identified at project inception	E-waste collection and management companies	Component 4: Business models and financial schemes on ELV management
Industrial sector, regional	Ampersand Rwanda; Kibo Africa Limited; Auto-Truck East Africa; Opibus Kenya Limited; Solar E-Cycles Kenya Limited; Bodawerk Uganda Limited	Design and manufacturing of electric 2W and 3W at various stages of development	<p>Component 2: Demonstration.</p> <p>Component 3: Fiscal policies and regulatory schemes on e-mobility; Development of business models and financial schemes</p> <p>Component 4: Business models and financial schemes on ELV management</p>

Stakeholder main group	Stakeholder name	Existing activities with potential to be leveraged	Contributions to the project
	Knights Energy	Design and implementation of charging infrastructure	Component 2: Demonstration.
	Twende Mobility Limited	Design of dispatching software	Component 2: Demonstration.
Corporate and government fleets	MEF. Services for vehicle procurement and operation	Optimization of their fleet management practices	Component 2. Validation of demonstration results Component 3: Fiscal policies and regulatory schemes on e-mobility; Development of business models and financial schemes
	Private companies (Orange Madagascar and others to be identified)	Optimization of their fleet management practices	Component 2. Validation of demonstration results Component 3: Fiscal policies and regulatory schemes on e-mobility; Development of business models and financial schemes
Research & Education	University of Antananarivo. IST (Technological High Institute)	Training and research on urban mobility	Component 1: E-mobility strategy Component 2: Design of demonstration and validation of demonstration results

Table 32: Stakeholders' expected contributions to the project

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 along project implementation through different channels, in accordance with their profile:

? Stakeholders from the national government will participate as full members of the Project Steering Committee (PSC) (meetings foreseen at least twice per year) and the new subcommittee on electric mobility within the CNCC.

? The National Women's Council will participate as full member of the PSC.

? The other stakeholders will be invited to participate in the subcommittee on electric mobility or to join the consultation advisory platform (D.1.1.3), as well as the project working groups (meetings foreseen at least quarterly), in accordance with their areas of interest. Depending on the contents of the PSC agenda, they could also be invited as observers at the PSC meetings on a case-by-case basis if the National Project Director considers it appropriate. Further information on the PSC and the project's working groups is available in section 6 and annex K.

The project will engage or communicate with the stakeholders as outlined in the Table below.

Stakeholder main group	Stakeholder name	Means of engagement	Rules for communication	Time of engagement
National Government	MEDD (Ministry of Environment and Sustainable Development)	PSC Regular meetings with PMU TWG4	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	At project start
	MTM (Ministry of Transport and Meteorology)	PSC Regular meetings with PMU TWG3	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	At project start
	MEH (Ministry of Energy and Hydrocarbons)	PSC Regular meetings with PMU TWG1	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	At project start

Stakeholder main group	Stakeholder name	Means of engagement	Rules for communication	Time of engagement
	MEF (Ministry of Economy and Finance)	PSC Regular meetings with PMU TWG2	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	At project start
	MEH, Electricity Regulatory Board (ORE)	TWG1	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	M.3 (start D.1.1.1)
	MPPSPF (Ministry of Population, Social Protection and Women's Promotion)	TWG1	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	M.6 (start D.1.1.2)
	DGPP Directorate General for Presidential Projects	PSC Regular meetings with PMU	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	At project start
	MTP (Ministry of Public Works)	TWG3	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	M.13 (start D.1.3.1)

Stakeholder main group	Stakeholder name	Means of engagement	Rules for communication	Time of engagement
Public Sector	JIRAMA Electricity and Water Utility	Exchange of correspondence, meetings	In accordance with external project communication procedures.	M.6 (start D.1.1.2)
	ADER (Rural Electrification Agency, <i>Agence de Développement de l'Électrification Rurale</i>)	Exchange of correspondence, meetings	In accordance with external project communication procedures.	M.6 (start D.1.1.2)
	ATT (Administration for Inland Transport)	Exchange of correspondence, meetings	In accordance with external project communication procedures.	M.13 (start D.1.3.1)
Local Gov.	CUA (Municipality of Antananarivo)	PSC Regular meetings with PMU LAG	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	At project start
	CUT (Municipality of Toamasina)	PSC Regular meetings with PMU LAG	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	At project start
Public Transport Associations	UCTU (Union of Cooperatives of Urban Transport)	Exchange of correspondence, meetings, training courses, demonstration design supervision, LAG	In accordance with external project communication procedures, to be defined in the project communication plan.	M.7 (start D.2.1.1)

Stakeholder main group	Stakeholder name	Means of engagement	Rules for communication	Time of engagement
	FMA (Coordinated Transportation for Antananarivo)	Exchange of correspondence, meetings, training courses, demonstration design supervision, LAG	In accordance with external project communication procedures, to be defined in the project communication plan.	M.7 (start D.2.1.1)
	3W operators in Toamasina: Soci?t? JADYS, Speedy Tuk Tuk, Gasmi, Trimoto ?	Exchange of correspondence, meetings, training courses, demonstration design supervision, LAG	In accordance with external project communication procedures, to be defined in the project communication plan.	M.7 (start D.2.1.1)
Civil Society Organizations	CNFM (National Women?s Council)	PSC, TWG1 Regular meetings with PMU	In accordance with external project communication procedures, to be defined in the project communication plan.	At project start
	Institut HI	LAG. Exchange of correspondence, meetings, training activities	During public meetings and on-demand	M.7 (start D.2.1.1)
Private financial sector	BOA Madagascar	Exchange of correspondence, meetings, TWG2.	In accordance with external project communication procedures.	M.31 (start D,3.2.2)
	Banque Nationale de l?Industrie	Exchange of correspondence, meetings, TWG2.	In accordance with external project communication procedures.	M.31 (start D,3.2.2)
	Soci?t? G?n?rale Madagasikara	Exchange of correspondence, meetings, TWG2.	In accordance with external project communication procedures.	M.31 (start D,3.2.2)
	Banque Malgache de l?Oc?an Indien	Exchange of correspondence, meetings, TWG2.	In accordance with external project communication procedures.	M.31 (start D,3.2.2)

Stakeholder main group	Stakeholder name	Means of engagement	Rules for communication	Time of engagement
	Assurance MAMA (Mutual Insurance MAMA)	Exchange of correspondence, meetings, TWG2.	In accordance with external project communication procedures.	M.31 (start D,3.2.2)
Industrial sector, local	Sakaiza and SAS Electric Motor	Exchange of correspondence, meetings, TWG3, LAG	In accordance with external project communication procedures.	M.7 (start D.2.1.1)
	Madauto	Exchange of correspondence, meetings, TWG3, LAG	In accordance with external project communication procedures.	M.7 (start D.2.1.1)
	E-waste collection and management companies	Exchange of correspondence, meetings, TWG4	In accordance with external project communication procedures.	M.34 (start D.4.2.1)
Industrial sector, regional	Ampersand Rwanda; Kibo Africa Limited; Auto-Truck East Africa; Opibus Kenya Limited; Solar E-Cycles Kenya Limited; Bodawerk Uganda Limited	Exchange of correspondence, meetings	In accordance with external project communication procedures.	M.7 (start D.2.1.1)
	Knights Energy	Exchange of correspondence, meetings	In accordance with external project communication procedures.	M.7 (start D.2.1.1)
	Twende Mobility Limited	Exchange of correspondence, meetings	In accordance with external project communication procedures.	M.7 (start D.2.1.1)
Corporate and government fleets	MEF. Services for vehicle procurement and operation	Exchange of correspondence, meetings, TWG2	Communication to be done by persons authorised to communicate. In accordance with administrative procedure requirements.	M.25 (start D.3.1.1)

Stakeholder main group	Stakeholder name	Means of engagement	Rules for communication	Time of engagement
	Private companies (Orange Madagascar and others to be identified)	Exchange of correspondence, meetings, TWG2	In accordance with external project communication procedures.	M.25 (start D.3.1.1)
Research & Education	University of Antananarivo. IST (Technological High Institute)	Exchange of correspondence, meetings, training activities, TWG3	In accordance with external project communication procedures.	M.7 (start D.2.5.1)

Table 33: Engagement and communication approach

The information and participation activities for stakeholder engagement will be fully identified in the Stakeholder Engagement Strategy foreseen as D.1.1.3 and will be supported by the information materials provided in output 3.3 and the communication activities foreseen in output 3.4 (including the project website). The project endeavors to make information available to all interested stakeholders and to the general public, so that they can know the environmental and social risks and impacts associated with the project, as well as the opportunities it provides, and to enable them to take better-informed mobility decisions through the use of electric technologies. The project will provide disclosure and consultation on the project's environmental and socio-economic performance to all stakeholders through project briefs and annual reporting, available in the project website. The project will also provide:

- ? An update on the project's achievements and its contributions to enhancing transparency.
- ? An overview of the stakeholder engagement process and how affected parties can participate and provide feedback through meetings or other channels.
- ? Project impacts and how the government is using the project data to enhance urban mobility in Madagascar and to reduce national GHG emissions.

The project envisages the establishment of several thematic working groups, which will be supervised by the project steering committee. These thematic working groups (TWGs) will cover the following topics:

- ? TWG on e-mobility policy ? This working group, under the leadership of the MEH and participation of all relevant ministries and public agencies, will steer the preparation of the national e-mobility strategy and the design of the proposals for regulatory reforms, as well as preparing the setting up of the e-mobility subcommittee.

? TWG on financial instruments and up-scaling. Under the leadership of the MEF and participation of the industrial, transport, financial and insurance sectors, this working group will steer the preparation of business models and financial schemes to speed up the deployment of EVs in Madagascar beyond the project's lifespan.

? TWG on technical knowledge management and replication. Under the leadership of the MTM and with the participation of the academia, transport operators and industrial companies, this working group will provide advice and guidance on the technological aspects of the project and the dissemination of technical know-how on the characteristics and operation of EVs and the transition of urban mobility towards sustainability.

Additionally, the project will set in place two local advisory groups, one in each of the participating cities, in order to facilitate the engagement of the municipal services and local stakeholders in the preparation, monitoring and evaluation of the demonstrations.

Select what role civil society will play in the project:

Consulted only; Yes

Member of Advisory Body; Contractor; Yes

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[\[1\]](#):

According to the World Bank (2020 data), about 70% of the population in Madagascar live below the poverty line (USD 100 per year per capita). 60% of the population are under the age of 25, with a medium age of 20.1 years for men and 20.5 years for women. The fertility rate of more than 4 children per women ensures that the Malagasy population will continue its rapid growth trajectory for the future. Women and men have equal access to primary schools and the literacy level is balanced (over 77.3% of men are literate and 72.4% women), but there are large disparities with respect to access to higher

education and employment. For example, men earn 37% more than women and women are more likely (by 20%) to be unemployed than men. This is then reflected in a higher unemployment rate for women.

The GoMG has ratified a number of international conventions related to the rights of women, including the 1979 Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) (ratified in March 1989). It has not ratified the 1999 Optional Protocol to the Convention, the Protocol to the African Charter on Human and Peoples' Rights, on the rights of women in Africa (Maputo, 2003) and the Southern African Development Community's (SADC) Gender and Development Protocol (2008).

Madagascar has also ratified the following fundamental International Labour Organization (ILO) conventions: the Equal Remuneration Convention, 1951 (No. 100, ratified on 10 August 1962) and the Discrimination (Employment and Occupation) Convention, 1958 (No. 111, ratified on 11 August 1961). It has not ratified some other conventions with a particular relevance for working women, such as the Workers with Family Responsibilities Convention (C156, 1981), the Maternity Protection Convention (C183, 2000) and the Violence and Harassment Convention (C190, 2019).

The country has also been involved and adhered to key international and regional instruments related to the advancement of women, including the Nairobi Forward-looking Strategies for the Advancement of Women (1985), the Beijing Declaration and Platform for Action (1995), the Millennium Development Goals (2000) and the Resolution 1325 on women and peace and security of the UN Security Council (2000).

The country's constitution (adopted in December 2010) makes reference, *inter alia*, to women's rights and provides for protection before the law regardless of sex. However, traditions and local customs still hampers women's access to estate property, particularly in rural areas. Relevant legislation includes the Law against gender-based violence (Loi n° 2019-008, 16 January 2020).

This gender analysis has taken into consideration the general context sketched above and is based on the information provided through on-line interviews and by the stakeholders' workshops held in February and August 2022. The government adopted a National Plan on Gender and Development (PANAGED) in 2003; this plan remains the reference for the integration of the gender dimension in all the areas related to socioeconomic development and provides guidance for strengthening and building capacities within the institutional structures on gender equality. The government, through its Directorate for Gender Promotion and gender focal points at each Ministry, is working with local traditional leaders in the identification and correction of discriminatory practices against women such as early marriage, excessive work for women, non-succession of land properties by women, the arrangement out of court about gender-based violence. Significant challenges remain, though at the institutional level, with gender issues not receiving enough attention from a government focused on structural socioeconomic reforms and a cultural environment still hampering women's access to land, technology and other productive resources[2].

The last Afrobarometer (2018)[3] found a large majority of the population disagreeing about traditional views of the role of women in society, such as their ability to carry out decision-making positions in politics, their access to jobs in competition with men or their rights to own land property. Although a

minority, the percentage of the population aggreging with discriminatory practices remained significant (around 30% to 40%) and with slightly higher percentages for the male population.

Gender equality and women's promotion are addressed by the government through the Directorate general for the promotion of women, within the Ministry of Population, Social Protection and Women's Promotion (Ministère de la Population, de la Protection Social et de la Promotion de la Femme, MPPSPF). As the Ministry is not publishing regular statistical report with gender-related indicators, information has to be gathered from general statistics or reports produced by other institutions. In 2021, INSTAT completed its fifth Demographic and Health Survey (*Enquête démographique et de Santé de Madagascar 2021, EDSMD-V*), stating inter alia significant remaining challenges in the field of gender-based violence: four out of every ten married or estranged women declared to have suffered acts of violence from her partner or ex-partner[4]. The last available data on gender-based violence comes from the 2012-2013 National Survey on Monitoring the Millenium Development Goals (*Enquête Nationale Sur le Suivi des Objectifs du Millénaire pour le Développement ? Madagascar (ENSOMD) 2012-2013*); it estimated that gender-based violence affected 30.1% of women; 45.2% of women and 46.3% of men found such violence as legitimate in certain cases. However, the results of the Afrobarometer (2018, although with a sample of just 100 interviews) shows that domestic violence is justified by only a minority of 3% of women and 5% of men.

Educational statistics show almost parity in the schooling rate at most educational levels, except in vocational training (where there is also a stark separation in the fields preferred by boys (industry, engineering..) and girls (services, tertiary sector). Educational achievement rates are summarized in the table below, showing the difficulties of a large part of the students to successfully complete their primary education and to access tertiary education[5]. There are also sharp differences in enrollment in certain university studies: for example, in the institutions offering tertiary education in scientific and technological fields (*Instituts Supérieurs de Technologie* and *Écoles Supérieures*) the share of women is, respectively, 39% and 33%.

Indicator (academic year 2015-2016)	Female	Male
% enrolled in primary education	49.7%	50.3%
% enrolled in secondary education (<i>college</i>)	49.9%	50.1%
% enrolled in secondary education (<i>lycées</i>)	50.5%	49.5%
% enrolled in vocational training (<i>lycées techniques et professionnels</i>)	34.4%	65.6%
% enrolled in tertiary education (2014-2015)	48%	52%
% drop-out in primary education	20.2%	19.8%
% successfully completing last course of primary education	4.4%	5.2%
% accessing tertiary education (2012-2013)	3%	4%

Indicator (academic year 2015-2016)	Female	Male
Literacy rate in the 15-24 cohort	64.8%	65.3%

Table 33: Schooling rates (year 2015-2016)

General figures do not show significant gender differences regarding the unemployment rate, which is estimated by ILO modelling to be currently low (2.6% of the population in 2021 by ILO[6]) and to affect almost equally women (2.7%) and men (2.5%). More detailed figures on gender and working conditions are available only from the survey completed in 2012 (*Enquête Nationale sur l'Emploi et le Secteur Informel*, ENEMPSI), and indicates some pervasive gaps in working conditions of women and men, that are unlikely to have been overcome since then[7]. For example, the employment-population ratio is lower for the female population (82%) than for the male population (88%) and is lower for the 15-24 cohort: 73% for young women and 75% for young men. Employment conditions are precarious: in 2012, only one job in ten (11%) was salaried, the rest being made up of self-employed workers and non-salaried family helpers. The rate of salaried women among employed women is just 8% compared to 13% for employed men. Income disparities were also significant: women earn on average half the monthly income of men (USD 12.3 compared to USD 24.8).

The last Human Development Report (HDR) from UNDP (2021-2022)[8] indicates that Madagascar ranks relatively well in terms of the Gender Development Index, with a score of 0.956, which places the country in the second of the five groups UNDP establishes to categorize gender development (the countries with higher gender development belong to group 1). This is consistent with the relatively narrow gaps between female and male populations in terms of expected years of schooling (10.2 for female population, 10.1 for male population) and the percentage of population with ages 25 and above with at least some secondary education (27.3% female versus 29.8% male). Additionally, the literacy rate[9] for adults (15 years and above) is 62.21% for female population and 66.74% for male population, with the gap closing to 64.78% versus 65.36% for the 15-24 years cohort. However, the Gender Inequality Index, which includes dimensions such as reproductive health, empowerment and the labor market shows a dimmer picture, with a score of 0.556, ranking Madagascar in the 143rd position of 177 countries.

In accordance with ENEMPSI-2012, the informal sector represents a refuge for survival and constitutes the largest provider of jobs for both sexes. There are more women than men in informal non-agricultural businesses (147 women for 100 men), but the opposite happens in informal agricultural businesses (95 women for 100 men). Women were largely under-represented in the management of industrial companies, even though they were the majority in terms of staff numbers; for example, whereas the industrial sector accounted for 8.1% of total employed women compared to 7.7% of total employed men, they were constrained to those tasks traditionally assigned to women (particularly in the industrial textile companies where almost two-thirds of the workforce are female). Additionally, 42% of formal companies had women as equity holders and 28% had women as top managers, most of them outside the industrial sector. In the informal sector, women represented more than half (58%) of entrepreneurs classified as independent and 40% of executives[10].

In accordance with the 2022 Global Gender Gap Report published by the World Economic Forum, Madagascar ranks in the 7th position within the 36 countries of Sub-Saharan Africa, and 48th at the global level, with a score of 0.735 (in a 0 to 1 scale, 1 indicating no gender gap), and ranking higher in the area of economic participation and opportunity (17th) and lower in political empowerment (75th). It ranks low in the 'legislators, senior officials and managers' indicator (83th), the 'women in parliament' indicator (106th, with only 22.7% of women) and relatively high (35th) in the 'women in ministerial positions' indicator (53.3%).

The project undertakes an affirmative action policy to give priority to women in accessing to capacity building and training activities and establishes gendered targets in this area.

The availability of gender-sensitive information in the transport sector is limited. The Living Standards Measurement Survey (LSMS) conducted in Antananarivo in 2016 provides some mobility information from about 2,300 households in the use of urban and suburban minibuses [11]: In Antananarivo, the percentage of people walking to work varies from 75% in the poorest quintile to 25% in the richest quintile; the percentage of people using minibus services varies from 20% in the poorest quintile to 45% in the richest quintile. Only 5% of the population own individual cars.

Minibus trip purposes differ by gender: minibuses are used to go to work (55.5% of male minibus trips versus 36.5% of female minibus trips), shopping (30.8% of female minibus trips and 16.2% of male trips), school (14.9% of women's trips and 13.3% of men's trips) and visit to family (8.1% of female minibus trips and 4.1% of male minibus trips). Additionally, the level of demand for transportation is also different between men and women: male passengers travel on average 4.69 times per week, and female 4.43 times per week. It was also found that male minibus passengers earn more than female and that the average travel time is slightly longer for women (51 minutes) than men (49 minutes). The service was considered unsafe by a higher percentage of women (20.6%) than men (16.9%) and uncomfortable by a similar percentage of women (20.4%) and men (19.6%). It is worth highlighting that a majority of the population walks to work.

The anecdotal information gathered during bilateral interviews and workshops supports the idea that, like in the rest of the region, ownership and operations in the transport sector, and in particular the urban transport sector in Madagascar is all but completely dominated by men. However, it was not possible to collect factual data on the number of women with driving permits, on the number of licenses held by women to provide urban transport services (3W and buses) or the number of vehicles owned and registered by women that would have confirmed this perception. It is also widely recognized that, for many average women it takes much longer to get a loan to buy a vehicle than it is for men of a similar economic profile, which constitutes an additional barrier for entrepreneurial and self-employed women to enter this sector. The negligible participation of women in the transportation sector workforce was generally associated to the challenging to working conditions and security issues; in this sense, EV features (for drivers) could be more appealing to women than the vehicles currently used in the public transport sector, as they provide advanced driving assistance and require less physical effort while driving on the poorly maintained roads of Malagasy cities. Although less numerous than men, the number of female students in vocational technological studies is substantial and would be ready to occupy jobs in the passenger transport sector, including the new jobs linked to electric mobility. There was also anecdotal information on the difficulties and anxiety suffered by

women to get back home after the evening peak hour, as public urban transport services become unreliable and even non-existent after 5-6 pm in many routes.

Primary potential risks of the project

The information collected allows to conclude that the transportation sector remains strongly male-dominated at the decision making, managerial and workforce levels, and that the particular mobility patterns and expectations of women compared to men are considered only marginally. There is a significant risk that, without effective consultation and inclusion of women in project activities, the introduction of EVs could serve to:

- ? Consolidate the current gender imbalance, as the new technology would be implemented in a male-dominated context in which it is likely to be used to serve primarily the mobility needs of those already enjoying better mobility conditions.
- ? Facilitate the development and implementation of policies and strategies on public transport that are not gender-sensitive, locking-in the existing male-dominated hegemony in the approach to public transport systems.
- ? Continue to promote unsafe conditions for women in public transport systems, if a gender-inclusive and gender-sensitive approach is not adopted in both design and implementation of policies and strategies.
- ? Introduce ineffective business models and financial mechanisms which do not take into consideration how women can gain fair access to financial products and instruments in Madagascar.
- ? Introduce negative health impacts on women and children, due to soil contamination by the inappropriate disposal of vehicles and batteries at their end of life, if women are not involved effectively in design and implementation of policies and strategies on end-of-life vehicle management, including EVs.

Opportunities

The introduction of EV technologies can also be transformative, serving as an opportunity to implement changes, so that EVs improve the mobility conditions of women (implementing vehicles in mobility services to be used mainly by women). It can also facilitate a more balanced access to transportation jobs (targeting driving, maintenance and fleet management training on women during project activities, including the demonstration). By involving women effectively in project design and implementation, and ensuring that interventions are gender sensitive, the project may support the introduction of increased economic opportunities for women in the transport and electricity sectors and support a just-transition of the workforce from existing high-emission technologies. The project MRV system can also serve to introduce gender-sensitive indicators within national transport statistics.

Gender Action Plan:

The project intends to ensure that: 1.) Women are well represented throughout the project activities and meetings, establishing a target in the share of female participants in workshops and trainings are women; 2.) The awareness raising activities as part of the project are designed in a way that they address the particular needs of women and use adequate channels of information.

The project will also intend to improve the availability of gendered information. During the development of the National e-mobility Strategy, gender-specific indicators on use and ownership of motorized transport will be collected and analyzed, in order to fill the current statistical gap and to facilitate that the strategy fully takes into consideration the mobility behavior and needs of women. Also, during the development of financial schemes supporting e-mobility, information will be collected and analyzed on barriers faced by women in the access to basic financial products.

Implementation of the gender action plan has been embedded within the project structure as follows:

The integration of gender issues within public policies addressing e-mobility will be developed through all outputs (1.1, 1.2, and 1.3) of component 1, with the relevant technical consultancies including a gendered approach. The stakeholder engagement plan will include guidance on the involvement and fair participation of women in the new e-mobility subcommittee. The National gender-sensitive E-Mobility Strategy developed in output 1.2. is supported by a gender-sensitive feasibility analysis on electrification, which will provide the necessary factual evidence and the appropriate actions to mainstream gender issues in the national strategy, including the key topics identified in the gender analysis section above; building upon this, the e-mobility strategy is expected to provide the adequate framework for a comprehensive consideration of the opportunities and challenges associated with the deployment of EVs to advance gender equality and to improve the mobility conditions, employment opportunities and empowerment of women. Within output 1.3, training activities targeting decision-makers and other key stakeholders will stress gender issues in transportation.

Should the MTM approve a new regulatory framework in urban public transport, the project would cooperate in the integration of gender-sensitive aspects in such regulations.

The gender dimension is integrated within component 2 along the whole demonstration cycle, from mobility demand analysis (outputs 2.1 and 2.2.) to the operation of electric 2Ws in Antananarivo and 3Ws in Toamasina (outputs 2.5 and 2.6), including the collection of gender-sensitive data whenever possible and the preparation of gender-sensitive technical guidelines, the provision of professional training and the involvement of women within the demonstrations as EV fleet managers, drivers or in maintenance provision.

The communication plan developed in output 3.3. and implemented in output 3.4 will integrate gender equality and will highlight women's mobility concerns as central messages. Besides output 2.3, access to jobs is also addressed in component 3, output 3.2 (access of women to financial services, with the project identifying gender-specific barriers in access to financial products while working with the financial sector for setting up affordable credits to facilitate the purchase of electric vehicles) as well as

output 4.3 (professional training on e-waste management and implementation of an e-waste management scheme in Toamasina). Some of the current barriers for women to access jobs in the transport and e-waste sectors have been discussed during project design, although few conclusions can be advanced at this stage: these barriers are probably associated to tradition, to conservative management and to unfriendly and exposed working environments, as in many other countries. The project adopts a pro-active approach, taking the introduction of electric vehicles (EVs) as a game-changer opportunity to foster women participation in the workforce by giving priority to women for accessing professional training and the new jobs in the companies associated with the project's pilots. The project should facilitate further streamlining of policies to facilitate the access of women to jobs in the relevant sectors based on these pilots and replication activities. At the upscaling stage after project completion, it will be critical for the public transport sector to provide a working environment more appealing to women, as their communicative and people-oriented skills can be of great value to improve the quality of the service. This could be supported by the previous identification of female drivers in taxi, public transport and vehicle maintenance services and the government's support to the involvement of women association in cooperations and associations.

Gender-oriented actions will be conducted by the Chief Technical Advisor (CTA) in partnership with the CNFM (*Conseil national de femmes de Madagascar*)- a member of the PSC- and the MPPSPM. The following activities addressing gender issues have been included in the project:

Project Component 1:

- ? Output 1.1. The terms of reference and workplan of the national e-mobility subcommittee and its stakeholder engagement strategy will integrate objectives on gender equality and balanced participation.
- ? Output 1.2. The preparation of the National gender-sensitive E-Mobility Strategy will include a gender-sensitive feasibility analysis in order to mainstream gender since the first preparatory stages of this policy document.
- ? Output 1.3. Training materials on e-mobility will be gender-sensitive and training activities will prioritize the participation of women at the national and global levels.

Project component 2:

- ? Output 2.1 and 2.2. The recommendations for the optimization of public transport services in Antananarivo and Toamasina will integrate gender-sensitive aspects.
- ? Output 2.5 and 2.6. Design of the e-mobility pilots in Antananarivo and Toamasina will address considerations on the potential contribution of EVs to improve the mobility and working conditions of women. The selection of operators in Toamasina will include requirements on the prioritization of women in the operation of the demonstration services and the compliance with a gender-sensitive code of conduct with passengers. Similarly, the local police and the selected private company in Antananarivo will be asked to prioritize women in the selection of the staff involved in electric 2W operations. Professional training activities will target in priority women, as a way to facilitate their access to the new jobs generated by the deployment of electric vehicles.

Project component 3:

? Output 3.2. The development of financial schemes to support fleet electrification will include facilitation of the access of women to financing.

? Output 3.3. The project communication plan and its materials will highlight associated gender-related topics, and recommendations to address them. For example, communication materials will include specific messages of the advancement attained by the demonstration on female participation in the urban transport sector and adaptation of urban transport services to women's priorities.

? Output 3.4. Multimedia campaigns will be designed and implemented with a focus on gender issues in transportation and opportunities offered by e-mobility to advance towards gender equality.

Project component 4:

? Output 4.2. Similar to all other training activities, those regarding the adequate technical management of end-of-life EVs and their batteries will prioritize the participation of women.

? Output 4.3. The selection of collaborating companies for the collection and management of end-of-life EVs and their batteries in Toamasina will include commitments regarding the participation of women

The approximate budget dedicated to the activities mentioned above is ? USD 45,000.

This approach is expected to be sustained after project termination through the inclusion of the project's gender-sensitive information and recommendations within the practice of the national and local governments, as well as within the private sector.

The Project Results Framework (PRF) includes some gender-sensitive indicators within, which will provide the necessary information for monitoring the Gender Action Plan:

The output indicators in the Table below will serve to monitor gender mainstreaming within project activities.

Project Components / Outputs	Gender mainstreaming Objectives	Gender mainstreaming Activities / Indicators	Targets / Means of Verification (MoV)	Responsibility
Project Objective	Maximizing project's impact on women	Core indicator B. Number of project's beneficiaries (men and women).	12,055 women (59% of total beneficiaries) MoV: Surveys and attendance lists	PMU

Project Components / Outputs	Gender mainstreaming Objectives	Gender mainstreaming Activities / Indicators	Targets / Means of Verification (MoV)	Responsibility
Overall Project Management	Gender considerations in key project's decisions	Activity: PSC meetings. Indicator: Attendance of CNFM to PSC meetings.	Target: CNFM participates at all PSC meetings MoV: List of attendance	CNFM
	Regular project reporting addresses gender	Activity: Completion of annual PIR. Indicator: Number of gendered indicators reported in the PIR.	Target: PIR includes 100% of indicators from the PRF (Annex A) MoV: PIR	PMU
Component 1 Output 1.1	Gender considerations are discussed at the e-mobility subcommittee	Activity: E-mobility subcommittee meetings. Indicator: Percentage of meetings including gender issues in their agenda	Target: 50% of meetings MOV: Meeting reports	PMU
Component 1 Output 1.2	Contributions of electrification to gender equality identified	Activity: Gender-sensitive electric mobility strategy. Indicator: The e-mobility strategy includes a section on gender mainstreaming	Target: Gender section completed MoV: National e-mobility strategy	PMU
Component 1 Output 1.3	E-mobility training of decision makers prioritize women	Activity: Identification of potential participants in e-mobility training Ind.1.3: Number and percentage of female participants	Target: 10 women (50% of attendants) MoV: Gender disaggregated attendance sheets	PMU

Project Components / Outputs	Gender mainstreaming Objectives	Gender mainstreaming Activities / Indicators	Targets / Means of Verification (MoV)	Responsibility
Component 2 Outputs 2.5 and 2.6	PT services adapted to women's needs	Activity: PT services during the demonstration in Toamasina integrate a gender perspective Ind. 2.1: Estimated number of female users of services provided by e3Ws in Toamasina.	Target: 60% of users MoV: Operators' reports and survey	PMU
Component 2 Output 2.5 and 2.6	Pilots advance participation of women in the 3W demonstration	Activity: Gender issues embedded in ToR for training and selection of EV staff Indicator: Number of women receiving professional training and engaged in the operation of EV in the demonstration fleets	Target: 15% of female trainees and drivers MoV: List of attendance and reports from operators	PMU
Component 2 Output 2.5 and 2.6	Progress in gender equality highlighted in the pilot communication materials	Activity: Section on gender within all communication materials about the pilot. Indicator: % of basic information including population data (tables and graphics) providing gendered information	Target: At least 75% of basic information is gender-sensitive MoV: Contents of the pilot communication materials	PMU
Component 3 Output 3.3	Mainstreaming gender in project communication materials	Activity: Integration of a gender perspective in communication materials. Indicator: Chapter on mainstreaming gender in the communication plan	Target: Communication plan includes gender chapter MoV: Communication plan	PMU

Project Components / Outputs	Gender mainstreaming Objectives	Gender mainstreaming Activities / Indicators	Targets / Means of Verification (MoV)	Responsibility
Component 3 Output 3.4	Women's mobility challenges explicitly addressed by communication activities	Activity: Quarterly reports on communication activities. Indicator: % of quarterly reports providing gender-disaggregated information on communication activities	Target: 50% of quarterly reports provide gender-disaggregated information MoV: Quarterly reports	PMU
Component 4 Output 4.3	Women gain access to professional training in e-waste management	Activity: Women are prioritized in training activities on end-of-life EV management Ind. 4.2: Number of women professionally trained on end-of-life EV management.	Target: 15% of female trainees MoV: List of attendance	PMU
Across all Components	Promote women participation in all project consultation and decision-making activities.	Activity: The participation of female representatives will be encouraged in all project consultation and decision-making activities outlined in the Workplan (refer to Annex L for more details) through a gender-sensitive outreach to stakeholders. Indicator: Average % of female participants attending the project consultation and decision-making meetings	Target: At least 30% of female participants in consultation and decision-making meetings MoV: Gender-disaggregated attendance sheets	PMU

Table 34: Gender Action Plan

[1] As some of the statistical data collected might be outdated (referring to 2012 or 2016), a local gender specialist was interviewed to confirm the relevance of this information. The MPPSPF, as one of the project's stakeholders, will be regularly contacted during the Project inception and implementation, to obtain any updated data and revise the gender action plan accordingly, if needed.

[2] MPPSPF (2014). Rapport de la R?publique de Madagascar dans le cadre du 20? anniversaire de la 4? Conference mondiale sur les femmes et de l'adoption de la d?claration et du programme d'action de Beijing en 2015.

[3] Afrobarom?ttre (2018). 7? s?rie de l'enqu?te. R?sum? des r?sultats.

[4] <https://www.instat.mg/p/resultats-de-lenquete-demographique-et-de-sante-de-madagascar-2021edsmd-v>

[5] MEN (2016). Annuaire Statistique National 2015-2016 and AfDB (2019).

[6] <https://donnees.banquemondiale.org/indicateur/sl.uem.totl.zs?locations=MG>

[7] Can be found on ILO-STATS

[8] <https://hdr.undp.org/content/human-development-report-2021-22>

[9] <https://countrymeters.info/en/Madagascar>. Countrymeters retrieved this information from UNESCO Institute for Statistics in March 2016 and has not been updated since then.

[10] AfDB (2019). Profil Genre Pays. R?publique de Madagascar.

[11] Iimi, A. (2019). Job Accessibility and Urban Transport Connectivity: Evidence from Antananarivo, Madagascar. World Bank Policy Research Working Paper 8959.

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

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

The private sector is expected to be the main project's beneficiary, as the bulk of the vehicle fleet in Madagascar is privately owned. Through the project, private companies (and eventually also

individuals) will have easier access to a cleaner technology, with lower operating and maintenance costs, as well as to better tailored financial instruments.

During the project design stage, several exchanges were held with Soci?t? Sakaiza and SAS-Electric Motor. This served to confirm the availability of valuable technical knowhow in the country and the capacity needs required to further develop a local assemblage industry. In terms of 3W operations, the option of any of these companies operating a large 3W fleet in Toamasina was discussed, but it was considered not feasible due to the financial limitations of these partners. This served to better understand the financial barriers of local PT operators, and to redesign the project?s pilots in a more realistic way, looking for the mobilization of a wider array of local operators through a scrappage scheme.

Also, during the project design stage, the Union of Cooperatives for Urban Transport (UCTU) shared its in-depth knowledge of the public transport sector in Antananarivo and provided detailed information on the current operating conditions and the need for urgent reforms. This helped to redesign the project and putting the recovery and modernization of the PT system in Antananarivo (and also in Toamasina) at the center of the project?s approach.

Finally, Madauto provided valuable information on the vehicle importing and sales sector in Madagascar and the conditions necessary for importers and dealers to consider the importation of electric vehicles. This information was particularly useful for the design of the project?s component 3. Additionally, Madauto provided some general information on the main private fleet routes in the country and the options for private 2&3W fleet owners to consider electrification; this information was useful to include the operation of a private fleet within the demonstration in Antananarivo.

In the case of the public transport sector, the project expects to contribute to the performance and profitability of their cooperatives and companies through the provision of business models including the operation of EVs, and through the recommendations made to local authorities to enhance the quality of public transport services (which should reduce operating costs associated to the use of old low-capacity vehicles, overlapping of lines and long idle times). The project will implement a friendly regulatory framework, and will demonstrate a scrappage scheme to support electrification, which could subsequently be scaled up. The higher upfront costs of EVs and the recovery of the additional investment through lower operating costs is undoubtedly a significant incentive to the consolidation of companies and individual operators within bigger companies and cooperatives benefiting from economies of scale.

The project plans to engage at least one private company in Antananarivo in the demonstration of an electric motorcycle fleet. It will receive technical guidance and support during the demonstration, and the results will facilitate the setting up of roadmaps for the electrification of corporate fleets in the private sector, initially focusing on large companies, and progressively trickling down to smaller ones.

Private companies in renewable energy, starting by those in the electricity sector in Antananarivo and Toamasina, are also expected to benefit, as the project will increase interest in the implementation of off-grid PV generation facilities and EV charging systems. EVs availability will expand electricity demand, improving the economic case for renewable off-grid electricity generation facilities.

Another private sector stakeholders benefiting from the project are vehicle dealers, importers, assemblers, and workshops. All of them are currently facing strong pressure from the import of outdated, second-hand vehicles with combustion engines, and such pressure could even increase as developed countries accelerate their own transition towards e-mobility. The project will support these private companies in their access to EV technology and will create a friendly regulatory framework for their transition. Furthermore, the technical characteristics of EVs open new opportunities to assemblers and other local industries to compete in at least some stages of the EV manufacturing process.

The following stakeholders in the private sector have been identified as relevant in project's implementation and co-financing:

? Soci?t? Sakaiza and SAS- Electric Motor have started the assembly and distribution of electric 3W in Toamasina, although for the time being with limited technical capacity and providing vehicles with modest performance. They would be key partners for the provision and maintenance of electric 3Ws during the demonstration, as well as for the future expansion of electric 3Ws in the country.

? Madagascar Automobile (Madauto) is the official distributor of different vehicle manufacturers (Renault, Nissan, Hyundai) in Madagascar. Toyota Rasetta and Toyota SICAM are official distributors of Toyota vehicles in Madagascar, including the minibuses widely used to provide public transport services. Although Toyota is not manufacturing electric minibuses yet, it has plans to do so in the near future. Accordingly, these companies are key partners for the electrification of the public transport sector.

? BOA Madagascar (a member of the Bank of Africa group), National Industrial Bank (*Banque Nationale de l'Industrie*), Malagasy General Society (*Soci?t? G?n?rale Madagasikara*, a member of Soci?t? G?n?rale group) and Malagasy Bank of the Indian Ocean (*Banque Malgache de l'Occ?an Indien*, a member of the French group BPCE) are the main private financial institutions active in the country, and all of them currently offer loans for vehicle purchase, although with conditions that make them hardly accessible to most public transport operators.

? Besides the public society Malagasy Mutual Insurance (MAMA, *Mutuelle d'Assurance Malagasy*), there are various private companies offering vehicle insurance (Sham, Allianz, NY Havana, ARO?). As EVs usually have higher upfront capital costs, and local insurance companies do not have information on the risk profile of EV users, there is a need for the project to work with this sector and provide information from other countries, so that they can adequately assess risks and develop appropriate insurance schemes.

? UCTU and FMA bring together most if not all private providers of regular minibus services in Antananarivo and its metropolitan area. In Toamasina, there is also a good number of providers of regular 3W services, such as JADYS *Soci?t?s*.

? The government is partnering with the private sector for the construction and operation of large electricity generation facilities. The future Sahofika hydroelectric plant is being built and will be operated by NEHO, a private consortium integrating Eiffage, Themis, Eranove and HIER.

? There is a significant number of local companies with know-how on able to install off-grid PV systems, which can be interested in entering the new field of and EV charging systems.

The private sector is also targeted by most of the capacity-building activities included in the project:

? Component 1 includes capacity building activities provided by the global programme and by the national project focusing on the technical advantages of EVs, their growth prospects and the appropriate standards and regulatory framework to accelerate such growth.

? Capacity building activities within component 2 will serve to increase the number of drivers and maintenance specialists in the country familiar with EV technologies, providing a much needed support to those private companies interested in using EVs.

? Capacity building activities within component 4 will facilitate the involvement of private companies in the management of EVs at their end of life, opening new business opportunities in this sector.

Finally, the involvement of the private sector in EV policy decision making will be supported by project:

? Stakeholders from the private sector will to be invited to participate as observers in the new E-mobility subcommittee, and its stakeholder engagement plan (output 1.1) will provide guidance to encourage their participation in the design of the National E-mobility Strategy.

The project will support and encourage the networking of private sector stakeholders to foster the deployment of e-mobility within component 3.

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):

Madagascar is particularly exposed to climate change due to its geographical position, the island frequently experiences extreme weather events that significantly affect its national economy, as well as the population's livelihood and these impacts has been severe during the last two decades.

Risk is defined as the effect of uncertainty on project objectives. It is formulated in terms of 'future events?'. Risks have been identified during project design through detailed stakeholder consultations and tools such as the UNEP Safeguard Risk Identification Form (SRIF), the gender analysis and the theory of change. A qualitative scale (low-medium-substantial-high) has been used to characterize the likelihood (probability of occurrence) and the negative impact on the achievement of project objectives associated to each risk.

The project analysis has identified the risks for the achievement of the intended results described in Table 35. They include environmental, financial, political, cultural and health risks. All of them are rated as moderate or low. The mitigation measures for these risks are aligned with UNEP's experience in other projects participating in the Global E-mobility programme, and the experience of private and civil society stakeholders as well as the municipalities of Antananarivo and Toamasina. The project is including activities addressing these risks: for example, the project is integrating gender or COVID challenges within its deliverables and develops awareness-raising and networking activities to gain broader consensus around electrification and sustainable urban mobility, as a way to facilitate their perception by decision-makers as low- or non-controversial measures.

Climate and COVID risk analysis are also provided in this section. During project design, COVID-related risks and opportunities were screened and assessed. One of the risks identified is that the COVID 19 pandemic stays as a pervasive threat, resulting in sustained changes in mobility and social behavior; the other risk relates to the spread of COVID and other respiratory diseases among workers during the operation of the electric 3Ws. Risk management measures have been identified to address both risks. The analysis has also identified some opportunities associated to the COVID pandemic, which could facilitate the transition towards sustainable, low carbon urban mobility: After experiencing COVID-related mobility restrictions, city dwellers are more aware of their ability to change travel behavior and adapt to restrictions, and the visibility of walking and cycling as safe and healthy modes deserving more attention and resources from local authorities has increased.

Risk description	Category	Risk level rating	Risk Mitigation Strategy and Safeguards	By Whom / When?
Risks to the achievement of the project objective				
Changes in the government's leadership and priorities	Political	Likelihood: M Impact: M	The project includes a strong collaborative approach, working with private stakeholders and the civil society to build up support and interest to e-mobility	PMU
Investments envisaged in renewables fail to materialize, leading to GHG savings lower than expected due to carbon-intensive electricity generation.	Political	Likelihood: L Impact: H	The project is creating enabling conditions on e-mobility that would remain useful even in case of delays in the expected investments, and will remain valuable once these investments materialize	PMU, MEH
Risks to the achievement of Outcome 1				
Lack of support to the e-mobility strategy due to poor involvement of key stakeholders or to lack of consideration of the mobility needs of women and socially marginalized groups.	Social	Likelihood: L Impact: M	The technical support budgeted in the project includes the consideration of socioeconomic, environmental and gender dimensions of the e-mobility strategy, and further know-how can be mobilized if needed (e.g. from other projects in the Global E-mobility Programme).	PMU
Risks to the achievement of Outcome 2				
Exposure and vulnerability to climate change of electricity supply, charging stations and public transport services.	Environment	Likelihood: L Impact: M	Location sites (and PT studies) will take into consideration risks such as heat waves, heavy rain and flooding. The design will include climate adaptation measures if deemed necessary.	PMU. Municipalities of Antananarivo and Toamasina

Inappropriate behavior of 3W drivers operating the project demonstration vehicles	Cultural	Likelihood: L Impact: H	Prior to demonstration fleet operations, a Code of Conduct will be prepared, and drivers and all those involved in the operations will be asked to abide by them. Professional training provided by the project will ensure that all those participating in the pilots are aware of their responsibilities.	PMU
Working conditions in the 2&3W services operated within the project do not meet national or labor laws and international labor commitments	Social	Likelihood: L Impact: M	Engagement of the private sector will be preceded by a private sector risk assessment to ensure compliance with labor standards.	PMU
Risks to the achievement of Outcome 3				
Negative perception of e-mobility technology and its benefits for Madagascar by key stakeholders (including the financial sector) and the public	Technical	Likelihood: L Impact: M	Awareness raising activities will be attuned to the current social perception so that the communication is targeted to the specific negative impressions. The national e-mobility strategy will be consistent with the socio-economic conditions in Madagascar. Activities with the financial sector will facilitate access to loans, at least for some potential users of EVs	PMU
Slow reforms in the public transport sector discourage operators to invest in EVs .	Technical	Likelihood: L Impact: M	Project's recommendations on PT and the involvement of cities, together with tailored business plans will contribute to the adoption of necessary PT reforms. Support from UNEP's Global E-mobility Programme will also mitigate this risk.	PMU, local and national governments, UNEP

EVs Market appetite for cheap second-hand ICE vehicles jeopardize the implementation of regulatory reforms	Economic	Likelihood: L Impact: M	The national e-mobility strategy will provide a general policy framework. The project's regulatory proposals will build upon experience in other countries provided by in order to provide a reform consistent with the socio-economic conditions in Madagascar. Activities with the financial sector will facilitate access to loans for EVs.	PMU, GoMG
Risks to the achievement of Outcome 4				
Reliability of electricity supply can further deteriorate by a growing demand from electric vehicles	Technical	Likelihood: L Impact: L	MEH's projects under implementation are already reducing this risk. The design of the pilot includes off-grid generation alternatives, and the project includes studies on the synergies of e-mobility and renewables.	PMU, MEH
The reduced number of vehicles to be recycled in the short-term weakens the commitment of recycling companies	Cultural/ Economic	Likelihood: L Impact: L	Component 4 will raise awareness, will associate the project to on-going policies on e-waste management, and will provide business models for second life of EV batteries and end-of-life management of EVs. The project is associating EV battery management with e-waste management, what provides a larger field for the action of recycling companies in the short term.	PMU, MEDD

Table 35: Assessment of project's risks

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 impacts of these risks been addressed adequately?

Madagascar is located in the basin of the south-west of the Indian Ocean and is subject to an alternation between dry (from May to October) and wet seasons (from November to April). It has four main climatic zones: the humid east coast, the central highlands, the North-West, and the semi-arid Southwest. The average annual temperature ranges from 14 to 22°C and the average annual rainfall is between 500 mm and 2750 mm[1]. Madagascar experiences variable climatic situations due to insufficient or irregular rainfall and is frequently subject to extreme climatic events (cyclones, droughts, floods, etc.) causing significant damage.

Temperatures have significantly raised: Minimum and maximum temperatures have increased by 0.04 and 0.05°C/year respectively throughout the territory over the period 1961-2017, coupled with an upward trend in extreme events. In addition, a decrease in winter and spring precipitation has been detected in most regions, and sea level is rising gradually, at a rate of 1.57 mm/year between 1993 and 2017; sea temperature in the western Indian Ocean has increased by 0.60°C between 1950 and 2009.

The project's climate risks are assessed through a 4-stage process including the identification of climate hazards (2050 horizon), the assessment of the exposure and vulnerability of the project's outputs to such climate hazards, the classification and ranking of risks and planning of mitigation measures.

-

Identification of climate hazards. In accordance with the National Adaptation Plan (2021), future changes in climate in Madagascar have been estimated following two emission scenarios: moderate (RCP 4.5) and high (RCP 8.5). In accordance with them, minimum and maximum temperatures could rise between +1.3°C and +1.6°C by 2050 and between +1.7°C and +2.9°C by 2080. Modelling results offer disparate conclusions regarding changes in rainfall, although they agree in forecasting a rainfall reduction in the winter (May to October) season, between 9.6% and 16% by 2080. The frequency of tropical cyclones is not expected to change significantly, although their intensity could grow by 46% and move northbound by 2100. Sea level is expected to rise between 0.28 and 0.48 m by 2100. Temperature increase would be higher in the south, west coast and the center of the country; rainfall would increase in the west coast, whereas it would decrease in the east coast, south and center of the country by 2100. Sea level rise would be more substantial in the mid-west coast (Morondava region), with an average of 7.4 mm/year.

Climate changes in Madagascar are expected to have diverse implications on the country's environment, economy, and social structure. Extreme weather events can have adverse impacts on public health (transmissible diseases), human settlements, transport infrastructure, agriculture production, landscapes, biodiversity, power supply and the economy at large. Adaptation efforts at the institutional level have resulted in legal texts, strategies and plans aiming at mitigating the risks brought about by these climate changes; however, their level of implementation has been limited due to the social unrest and political instability in the 2015-2021 period.

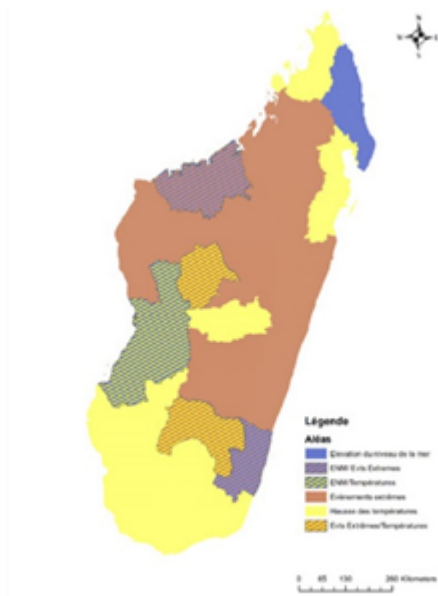


Figure 1 : Synthèse des aléas climatiques majoritaires cumulés par région (sur la base du travail effectué lors des concertations inter-régionales et des perceptions recueillies).

Figure 9: Main Climate Hazards in Madagascar

Vulnerability and exposure. The demonstration activities of the project are located in Antananarivo (central region) and Toamasina (east coast), but with an ambition of being replicated throughout the country in urban and rural environments. Electric mobility relies on the existence of adequate road infrastructure (as any other road transport vehicle technology) and, additionally, to the availability of electricity provided by reliable charging infrastructure. All these conditions are far from being satisfactorily met, and in the absence of the implementation of the adaptation measures foreseen by the government's adaptation plan (PNA-2021), electrified mobility would not be resilient enough to meet the challenges of a changed climate in Madagascar beyond 2050.

Regarding the road network, bitumen-paved roads could be deteriorated by higher temperatures, and road infrastructures could be affected. The already poor resilience of the system (degraded pavement and drainage infrastructure) could be further stressed by more frequent heavy rainfall and those close to the coast could be affected by the rising sea level. However, the level of exposure of the transport system does not change significantly due to the project-induced electrification of the fleet, as the conditions of use of the road network are the same for conventional and electric vehicles.

Regarding electricity supply, in the absence of adaptation measures, changes in climate would increase the unreliability of electricity generation, due to the eventual reduction in water flows (associated to rising temperatures and-at least in some regions- decreasing rainfall) and more irregular raining regimes, as well as to the poor conditions of the distribution grid (subject to the effects of heavy winds and rains). The government's plans to substantially increase the country's electricity generation capacity and to develop and upgrade the distribution grid should reduce the vulnerability of the system.

Considering its small size, the vulnerability of the project to changes in climate is low; however, its prospects for replication and up-scaling in the future could be slowed down due to changes in climate, if the government's projects in the electricity sector fail to materialize, as EV charging is vulnerable to disruptions

in the operations of the charging network. The project is providing guidance for the future deployment of the charging network through the national e-mobility strategy and will address recommendations to attain sufficient resilience for the future charging network. From a technical perspective, the characteristics of the charging infrastructure systems available today in the market can deal with the foreseen changes in climate in the 2050 horizon (higher precipitations in some regions and higher temperatures throughout the country). From an exposure perspective, charging infrastructure is highly flexible in terms of location, making it simple to avoid or reduce exposure to extreme climate events.

Climate change risks identified. Risk screening has identified several risks related to climate change: the exposure to climate events of (1) the electricity system (2) the charging infrastructure and (3) electrified public transport services.

The likelihood of occurrence of the first risk is assessed as low. The reason is that Madagascar has an impressive potential for electricity generation from renewable sources, and the government is already implementing relevant investments to materialize such potential. Although the availability of electricity is covering only a small part of the country, it is concentrated in the most populated and urbanized areas, and particularly the Antananarivo- Toamasina corridor, where electric vehicles will sooner attract the interest of consumers. The impact of this risk on the project is also low, due to the fact that the tested vehicles have modest recharging needs, which can be satisfied at domestic charging points in case of disruption and that affordable off-grid charging solutions are being deployed during for the demonstrations and can be installed also by interested investors, as electric vehicles become available in the country.

The likelihood of occurrence of the second risk is assessed as low. The project has wide flexibility to choose the location of its charging infrastructure in the two pilot cities, and the national e-mobility strategy intends to integrate climate adaptation goals, so that the future network of charging infrastructure be resilient enough to extreme weather events.

In what refers to electrified public transport services, their exposure to climate events is similar to that of the services provided by conventional vehicles. It is linked primarily to the conditions of the urban road network used by the public transport services, and to flexibility of the vehicle to move to alternative routes in case of disruptions in certain streets. In this sense, the studies on public transport operations will include contingency plans to restore public transport services in case of disruptions due to extreme weather events.

Mitigation measures on Climate Change Adaptions risks. The project advances some adaptation measures, aligned with the National Adaptation Plan (PNA-2021) and with the axis 3 (climate change and energy transition) of the national plan established by *Initiative Emergence Madagascar* (IEM). Since 2019, the metropolitan areas of Antananarivo and Toamasina have integrated in their land use plans (*Plans d'Urbanisme Directeur*, PUDI) the principles of climate risk management and adaptation to changes in climate. The PNA foresees the completion of vulnerability studies in urban areas, followed by the identification of adaptation measures tailored to the needs of local populations and the adoption of contingency plans. Furthermore, the national government is committed to increase the resilience of critical urban infrastructure, including transport and electricity infrastructure.

As a mitigation measure, the project intends to provide support to off-grid electricity generation. The resilience of the urban transportation system will be increased by developing energy-supply systems less

vulnerable to the disruptions of extreme weather events, higher average temperatures, and other adverse changes in climate. This is fully aligned with the actions outlined by the GoMG in its national plan (IEM) to foster the energy transition through the expansion of renewables and distributed generation, as well as with improvements in the integrated distribution grid. Through its National E-Mobility Strategy, the project will provide guidance for the expansion of the charging infrastructure network, combining on-grid and off-grid solutions in accordance with the country's plans for the energy sector.

(iv) Has the sensitivity to climate change, and its impact, been assessed?

A preliminary assessment of the technologies and infrastructure to be deployed during the project indicates that their sensitivity to flooding, heavy rain and wind risks is low, provided the location of the charging infrastructure takes into consideration the exposure to such extreme weather events, based on existing vulnerability studies and historical data.

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

The project is fully consistent with the country's energy transition stated in its PNA. Such transition will result in a substantial the reduction of the country's current dependency on imported fossil fuels through the mobilization of its vast resources in renewables. Reliance in electricity produced from renewable local resources, will make the transport system more resilient to changes in climate. Additionally, electric vehicle technologies have proved to be more robust than conventional ones, and easier to adapt to higher temperatures and other changes in climate, as technological improvements are making batteries more efficient under high temperatures.

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

Technical capacities will be necessary to properly identify locations exposed to extreme weather events (with a focus on coastal areas) during the preparation of the National Electric Mobility Strategy (component 1) and the design of the demonstration (component 2). Furthermore, knowledge on technical specifications for solar panels, charging infrastructure and electric vehicles will be necessary to make them compatible with existing and foreseen climate conditions; this will provide the basis to prepare regulatory recommendations, such as building codes or technical vehicle approval, during the project.

Institutional capacity will be built-up in parallel with these technical recommendations, through training activities and guidance materials. Contingency plans will be developed for the continuation or recovery of charging services and transport operations in case of disruption after extreme weather events during the demonstration. These activities will facilitate resilience during the replication of the project.

Covid-19 Risk and Opportunity Analysis

Although vaccine availability has not been an issue, with more than 4 million doses received by April 2022 and additional 3 million doses secured, vaccine hesitancy remains a significant barrier to achieve reasonable population coverage. The rate of vaccination in Madagascar has been low (less than 10,000 people vaccinated per week^[2]), meaning that it would take more than 20 years to reach the government's

own objective, which fall short of the Africa CDC recommendations. This creates a challenging framework for economic recovery.

Challenges and risks.

Government's priorities. The global COVID crisis severely hit the country, with a recession 3 times deeper than in the rest of Sub-Saharan Africa and the recovery in 2021 halted in 2022 following the international economic and political turmoil, so that the WB has revised its growth prospects down to 2.6% (compared to previous 5.4%) in 2022, 4.2% in 2023 and 4.6% in 2024, as a result of weaker external demand. This challenging economic context could hamper or delay the plans and regulatory reforms expected to be adopted by the government during the project, slowing down the deployment of renewable electricity generation and the expected regulatory reforms to support the electrification transition in the transport sector. It could be argued, however, that this challenging economic situation could serve to accelerate reforms supporting better access to services and infrastructure, including electricity and transportation.

Restrictions to the passenger mobility. Lockdowns and mobility restrictions in Antananarivo and Toamasina resulted in significant economic losses for public transport operators, especially in the capital. This has further weakened their financial capacity, although demand recovery has been robust in the last months. Low vaccination levels leave the population exposed to future waves of new virus variants and, coupled with sluggish economic recovery, generates uncertainty on future travel demand, including the number of passengers making use of the electric 3Ws during the demonstration. Low ridership would refrain transport operators from investing in electric vehicles, as the prospects to recover the initial investments become uncertain. This could compromise the project's ability to reach the expected number of beneficiaries.

Users' concerns on the safety of 3Ws. Although transport operators do not report any concerns from customers concerning disinfection and other prevention measures in public transport, this attitude could change if new waves of the disease hit the country. The project includes the development of prevention measures to the operators of the demonstrations fleets to mitigate this risk.

Global trade disruptions. Besides affecting the economic climate in Madagascar, disruptions in trade chains could affect the availability and accessibility to critical components of the electric vehicle, such as batteries and spare parts. The project plans to benefit from UNEP's global programme action to mitigate this risk through negotiations with manufacturers for the provision of electric vehicles in all African participating countries.

Mitigation measures

In the identification of the mitigation measures to cope with Covid-19 risks, the following aspects were considered;

- ? Availability of technical expertise and capacity, as well as adaptive capacity to changes in timelines.
- ? Government capacity as human resources are mobilized elsewhere.

- ? Change in capacity of other executing entities and the effectiveness of the overall project implementation arrangement.
- ? Limited capacity and experience for remote work and online interactions as well as limited remote data and information access and processing capacities that projects will need to strengthen.
- ? Changes in project implementation timelines.
- ? Changes in baseline.
- ? Changes in conditions of beneficiaries.
- ? Stakeholder Engagement Process: Mobility and stakeholder engagement, including risk mitigation measures for both project staff and stakeholders.
- ? Enabling Environment.
- ? Government focus on environment during crisis.
- ? Government priorities during COVID-19 response.
- ? Financing: Co-financing availability and price increase in procurement.

Changes in government's priorities. The project is mitigating this risk by separating- to the extent possible- the institutional activities in component 1 from the demonstration in component 2, so that the latter can be continued even if delays in the former occur.

Restrictions to passenger mobility. Mobility restrictions would require the project to continue many activities online or rescheduling them. Restrictions measures have a direct impact on the daily operations of the project (e.g. through the need to rely on teleworking), as well as on the organization of project activities (training, consultation workshops, meetings) and the effective engagement of stakeholders. Furthermore, technical consultancy activities can be affected, limiting or preventing international and even national consultants to undertake in-field missions. Reductions in travel demand would require the project to redesign its demonstration, looking for alternative niche mobility markets in Antananarivo and Toamasina, which could operate even under restrictions (e.g. providing services to essential workers or to students). This can be done during the pilot's feasibility and design analysis in component 2.

Users' concerns on the safety of public transport services. The project already includes the development of prevention measures to the operators of the demonstrations fleets to mitigate this risk.

Global trade disruptions. The project plans to benefit from the negotiations of UNEP's global e-mobility programme with manufacturers at the time of the provision of the electric vehicles.

Opportunities

This analysis has also identified the emergence of some opportunities, associated to the COVID-19 pandemic, to advance towards sustainable, low-carbon urban mobility[3].

Changes in government's priorities. The project can contribute to a green post-pandemic recovery, as illustrated in recovery plans around the world (e.g., Next Generation EU), by reducing Madagascar's dependency on fuel imports and opening up new industrial opportunities in 3W assembling. The project will make use of this potential to further increase the interest of decision makers in electric mobility.

Restrictions to passenger mobility. The COVID pandemic provides a stronger case to improve public transport quality and dedicate the necessary public resources to it. Additionally, walking and cycling have gained visibility as safe and healthy modes, and have received more attention- including reserved space on streets- by many local authorities. Together, the increased decision makers' and the general public's awareness and acceptance to dedicate more public resources to improve the quality and safety of public transport services and to give priority and more space to walking and cycling- provide unique opportunities to accelerate the transition towards sustainable, low carbon mobility.

Users' concerns on the safety of 3Ws. Some of the characteristics of 3Ws (few passengers, open-air?) make them appealing for those searching for COVID-safe transport means with reduced contagion risks. These characteristics will be highlighted by the project.

[1] Ministère des Transports, du Tourisme et de la Métrologie, CPGU, Métro Madagascar, Banque Mondiale et Rime, (2019). Les tendances climatiques et les futurs changements climatiques ? Madagascar ? 2019.

[2] World Bank (2022). Madagascar Economic Update.

[3] Basu (2021): Basu, R. and J. Ferreira (2021). "Sustainable mobility in auto-dominated Metro Boston: Challenges and opportunities post-COVID-19." *Transport Policy*. 103: 197-210.

Fatmi, M. R. (2020). "COVID-19 impact on urban mobility." *Journal of Urban Management*. 9(3): 270-275.

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:

The institutional arrangement for project implementation is presented in the figure below.

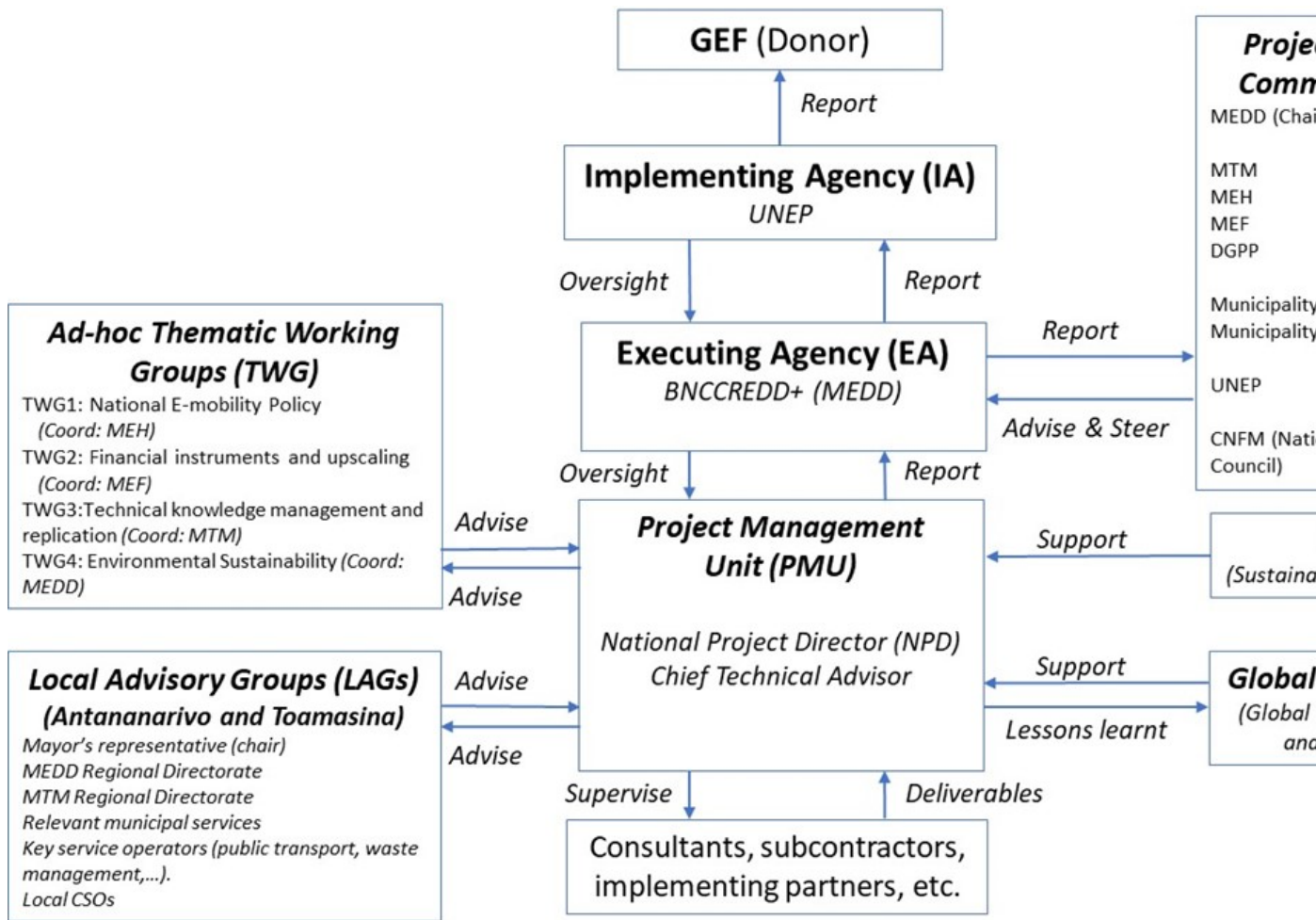


Figure 10: Institutional Arrangement Chart

This project is funded by the GEF and co-financed by Ministry of Environment and Sustainable Development of Madagascar, Ministry of Transport and Meteorology, Ministry of Energy of Hydrocarbons, as well as by the municipalities of Antananarivo and Toamasina. UNEP will be acting as the GEF Implementing Agency and the MEDD will be the project's Executing Agency, more specifically the MEDD's *Bureau National pour le Changement Climatique et REDD+* (BNCCREDD+). 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 Secretary General of the Ministry of Environment and Sustainable Development (MEDD) and will convene at least twice per year. PSC will also oversee adequate gender mainstreaming and mobilization of gender expertise in the relevant project activities.

A **Project Management Unit (PMU)** will also be established within Ministry of Environment and Sustainable Development of Madagascar to manage day-to-day operation of the project. The PMU will include the National Project Director (NPD), the Chief Technical Advisor (CTA) and the administrative support. The PMU can also include MEDD officials, as part of the MEDD's in-kind contribution to project management. The PMU will implement gender mainstreaming and provide adequate gender expertise, directly or through the mobilization of external assistance. Gender-oriented actions will be conducted by the Chief Technical Advisor (CTA), in partnership with the CNFM (Conseil national de femmes de Madagascar) and the MPPSPM.

Ad-hoc **Technical Working Groups (TWG)** will be formed to facilitate the involvement of interested partners in the implementation of the project components. Participation will be open to interested stakeholders upon invitation or request addressed to the CTA. The TWGs will provide technical advice, as well as facilitate networking at the national level. The TWGs will meet on an ad-hoc basis during project implementation, with the secretarial support of the MEDD and the PMU. Efforts will be made to ensure that the working groups are gender-balanced, include participation of relevant gender-representative groups (such as the MPPSPF and other stakeholders identified in the gender analysis section above), and follow gender-sensitive processes. The TWGs will meet regularly during project implementation to cover the following topics:

? TWG1: Intersectoral subcommittee on e-mobility. (Coord: MEH). TWG1 will facilitate the interaction and coordination of key services within the GoMG with competences in the electrification of the transport sector, and the engagement of other stakeholders in the preparation of the National E-Mobility Strategy. TWG1 is expected to be formalized by the GoMG before the end of the project, as a subcommittee within the National Commission on Climate Change, a key instrument for the project's sustainability and for the implementation of the National E-Mobility Strategy. TWG1 will provide advice to the PSC, and will serve as a participatory channel for deliberation on sustainable mobility and electrification, involving stakeholders as well as individual experts not formally included in the PSC. Key members of TWG1 may include the MTM, MEDD, MPPSPF and MEF. It will play a key role in the activities included in Component 1.

? TWG2 (Coord: MEF). Technical working group on financial instruments and scaling-up. TWG2 will provide support to the project activities related to the design and implementation of sustainable mechanisms to finance the electrification of the transport sector (component 3). Key members of the working group will include financial institutions, such as BOA Madagascar, *Banque Nationale de l'Industrie, Soci?t? G?n?rale Madagasikara*, *Banque Malgache de l'Oc?an Indien*, MAMA (*Mutuelle d'Assurance Malagasy*), and other insurance companies (Sham, Allianz, NY Havana, ARO...).

? TWG3 (Coord: MTM). Technical working group on knowledge management and replication. TWG3 will facilitate the engagement of institutions, the private sector, academia, civil society organizations and individual experts in the dissemination of project's results (through the project's website and other websites), the validation of the project's conclusions and lessons learnt and the deployment of the National

E-mobility Strategy, contributing to the replication of the project's best practices after its termination (component 3).

? TWG4 (Coord: MEDD). Technical working group on environmental sustainability of e-mobility. TWG4 will facilitate the engagement of stakeholders in the implementation and monitoring of the Component 4 activities aiming at addressing the potential environmental impacts of electrification. It is expected to engage formal and informal actors in the waste management sector dealing with ELV and batteries.

A Local Advisory Group (LAG) will be established in each of the participating cities (Antananarivo and Toamasina) with the following terms of reference:

Purpose: Provide political guidance to the development and execution of the demonstration (Component 2) and other project activities in Antananarivo and Toamasina. It serves as the primary voice of the city in ensuring that project interventions are aligned with local priorities and needs. Key functions of the LAGs will include:

- ? Ensuring political buy-in of the local government and the provincial government, including as related to local government internalization and use of project outputs (such as the platforms, plans, pilots, etc.).
- ? Ensuring buy-in of key local stakeholders, including academia, private sector and civil society and their effective contribution to the project where required;
- ? Providing guidance for the development of technical terms of reference (TOR), reviewing TORs and providing technical input to support their elaboration and finalization (noting that the PMU and the Executing Agency have final decision on the awarding of contracts);
- ? Identifying possible key local partners for execution of project activities;
- ? Reviewing and providing technical input to technical documents as related to local project activities;
- ? Ensuring the design of local project interventions is aligned with local and provincial priorities (noting that the PMU and the Executing Agency have the final decision on project design, in coordination with UNEP and in alignment with the CEO endorsement document);
- ? Facilitating the executing of project activities in the local jurisdiction, including the obtaining of local and provincial governmental permissions as required to execute the project pilots and other project activities;
- ? Facilitating and supporting M&E activities;
- ? Supporting communication and diffusion of information on the project with local stakeholders;

? Serving as a first point for local stakeholders to express grievances who may be adversely affected by the GEF UNEP project. In the event that such concerns are not resolved at the local level, such stakeholders may access UNEP's Stakeholder Response Mechanism, operated through the Independent Office for Stakeholder Safeguard-related Response (IOSSR).

Scope: All project activities in the respective city.

Membership: The LAG will be chaired by a city representative nominated by the mayor. The LAG secretary will be provided by the PMU. The LAG will include representatives from municipal and provincial technical services relevant to the project's activities in the city. The LAG may also include representatives from local civil society organizations, including gender groups, academia and the private sector, to be determined and appointed by the LAG chair. The LAG will strive to be gender balanced.

Meeting arrangements: The LAGs will meet on a minimum quarterly basis, and ideally monthly, in their respective cities (or virtually) to discuss the progress in the implementation of Component 2 in the city.

Reporting: Minutes will be prepared after each meeting and made publicly available on local governmental platforms a maximum of one month after the meeting. The LAG will decide on a case-by-case basis the need to keep information private.

Resources: Each LAG (1 in Antananarivo and 1 in Toamasina) receives resources for meeting logistics to a maximum amount of USD 16,000 over the four years of the project (8 meetings, USD 2,000 each). Additional resources may be requested and will be considered on a case-by-case basis by the PSC.

The UNEP Sustainable Mobility Unit (SMU) will provide technical support through the budget line ?International E-mobility Technical Support (UNEP SMU), which foresees a total budget of USD 14,000 for technical assistance and USD 11,000 for 4 visits to Madagascar, associated to outputs 1.1, 1.2, 2.5, 2.6, 3.1, 3.2, 4.1 and 4.2. The responsible staff in the UNEP Sustainable Mobility Unit (SMU) providing executing support to the MEDD will have different reporting lines to the staff assigned to deliver GEF IA functions (UNEP's Climate Change Mitigation Unit). The budget breakdown is presented in the table below and will cover the following actions:

- ? To support with the institutionalization of e-mobility, notably with the creation to a national coordination body and the development of a national e-mobility strategy for Madagascar;
- ? To support the implementation of the demonstration projects in both Antananarivo and Toamasina;
- ? To support policy development and financing schemes;
- ? To support the development of studies around environmental sustainability of e-mobility;
- ? To support with the recruitment and contracting of international experts / firms, facilitating discussions among the Ministries and project stakeholders, and technical troubleshooting;
- ? Four (4) field visits to Madagascar, to support the country on the elements described above.

Component	Output	Budget Category	Budget (USD)
Component 1: Institutionalization of low carbon electric mobility	Output 1.1: An inter-sectoral subcommittee on electric mobility is established within the National Committee on Climate Change (CNCC)	Staff time	3,000
	Output 1.2: A national gender-sensitive electric mobility strategy is developed and submitted to the government for approval	Travel	2,500
Component 2: Short term barrier removal through low carbon electric mobility demonstrations	Output 2.5: Technical and economic feasibility of E2Ws in Antananarivo is validated through piloting E2Ws in one public and one private fleet.	Staff time	5,000
	Output 2.6: Technical and economic feasibility of E3Ws in Toamasina is validated through operation of E3Ws within public transport services and through development of a scrappage scheme providing incremental incentives to operators.	Travel	3,500
Component 3: Preparing for scale-up and replication of low carbon electric mobility	Output 3.1: Fiscal and regulatory reforms to incentivize the uptake of electric mobility are submitted to the government for approval	Staff time	4,000
	Output 3.2: Financing schemes are developed and submitted for implementation, including procurement guidelines (e.g., technical specifications), for the scaling-up of the electrification of buses, 3Ws and 2W fleets	Travel	2,500
Component 4: Long-term environmental sustainability of low carbon electric mobility	Output 4.1: A study to integrate renewable power for electric vehicle recharging is carried out.	Staff time	2,000
	Output 4.2: The country's framework for e-waste collection is revised, in order to integrate electric vehicle batteries.	Travel	2,500
Total			25,000

Table 37: Breakdown of budget allocated to UNEP SMU

? Coordination with other initiatives:

Coordination with initiatives at the city level (components 1 and 2). In Antananarivo and Toamasina, coordination will primarily be facilitated through the respective LAG, together with the PMU and the local

government. As the national government may undertake some investment initiatives in these cities, the project will coordinate with the relevant ministries through the PSC and the TWGs. This is for example the case for the implementation of the *Schéma directeur des Transports pour la ville d'Antananarivo* (SDT), focused on new infrastructure needs to be covered by the national government and approved in 2022.

Coordination with initiatives at the financial level (component 3). It will take place through the participation of the financial actors mentioned above in TWG3 and in other project activities.

Coordination among institutions within the national government (component 4). The MEDD, as the ministry responsible for GEF-fund execution in the country, will facilitate coordination with all national GEF projects. Through its component 3, the project aims at strengthening the interaction among public and private stakeholders. For this, the project will reach out to the relevant project implementation units in other ministries through its PMU, TWGs and LAG. At this moment, the following projects have been identified in Madagascar:

? #10413: GEF-7 Africa Minigrids Program. This program may be of relevance for the preparation of the National E-mobility Strategy, as it can provide useful guidance on the prospects for electricity availability throughout the country.

? #10019: Umbrella Programme for Preparation of National Communications and Biennial Update Reports to the UNFCCC. The consideration of urban mobility and more generally of transport policy within the next BUR provide an opportunity to better integrate electric mobility within national policies.

? #9948: Building and Strengthening Madagascar's National Capacity to Implement the Transparency Elements of the Paris Agreement.

The project will also coordinate with the Global E-mobility Programme by engaging in its global and regional platform's activities. Regarding the global indicators, the project Executing Agency will report to UNEP, and UNEP will report to the Global Programme. Regarding participation of Madagascar in the activities and platforms of the Global E-Mobility Programme, and reporting on the project's achievements (lessons learned), the PMU will be in regular contact with the global programme:

? Stakeholders' representatives from Madagascar will benefit from the training provided by the global programme.

? The project will also benefit from the technical assistance provided by the global platform-led communities of practice.

? Matchmaking and international funding opportunities identified by the global platform will be disseminated among stakeholders in Madagascar.

? Exchange of information will be facilitated between the global and the national projects.

The project will coordinate with the following World-Bank funded projects:

- ? P176811: Madagascar Road Sector Sustainability Project. This project aims at improving periodic and routine maintenance in the primary roads of the country, including primary roads in the metropolitan areas of Antananarivo and Toamasina.
- ? P173711: Connecting Madagascar for Inclusive Growth Project. This project aims at improving the connectivity, resilience, and management of key roads in selected rural areas. It can be relevant to properly address the expansion of e-mobility to rural areas within the National E-mobility Strategy.
- ? P175087: Additional Financing to Integrated Urban Development and Resilience Project for Greater Antananarivo. This project will enhance urban living conditions and flood resilience in selected low-income neighborhoods of Greater Antananarivo, and can be relevant to assess accessibility conditions and public transport services in the metropolitan area, as a preliminary stage towards their electrification.
- ? P63870: Madagascar - Least-Cost Electricity Access Development Project ? LEAD. This project will increase access to electricity services for households, enterprises, and health facilities in Madagascar, providing valuable information for the preparation of the National E-mobility Strategy.

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P151785: Electricity Sector Operations and Governance Improvement Project (ESOGIP) with additional financing provided by project P164318. This project supported the preparation of the National Electrification Strategy, NES 2015-2030, and has been extended until 30.6.2023. It provides the general framework for the expansion of the electricity system, a crucial issue for the preparation of the National E-mobility Strategy.

7. Consistency with National Priorities

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

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

The project is consistent with national priorities, as stated in the following strategies, plans, reports and assessments:

- ? The **3rd National Communication (NC-3)** of Madagascar under UNFCCC was submitted in 2017, including an update of the national emission inventory with 2010 data, with an estimate of just 0.99 Gg CO₂e of emissions from the transport subsector (around 0.07% of the total, 3.5% of the total excluding LUCF emissions), although some sources (WRI's CAIT) estimate it can have grown by 47% between 2010 and 2018, with a potential to become a relevant source of GHG emissions as the country's economy grows. As the expansion of electric mobility will reduce the import and consumption of fuels in Madagascar, the project contributes to the reduction of GHG from transport. The mitigation section of the NC-3 builds upon the **Intended Nationally Determined Contributions**, that Madagascar has submitted in 2015 (INDC-2015). The main mitigation measures are linked to the construction of hydroelectric plants

and to expansion of renewables, but it includes some measures in the transport sector, such as the introduction of biofuels, the improvement of the efficiency of public transport services (with the use of buses with higher capacity), a strategy for the reduction of the average age of the vehicle fleet and the control of the vehicles' roadworthiness. In 2022, the MEDD has started the preparation of an updated NDC.

? Based on the PNLCC (2011), the **PANLCC** (2019) provides actions with a 10-year horizon and structured in 12 programmes, including 'strengthening the deployment of renewable energy and electrification' and the 'development of sustainable mobility for the reduction of GHG emissions and improvement of air quality in the metropolitan area of Antananarivo (Grand Tana)'. The MEDD is currently updating the contents of the PNLCC (2011) and its Nationally-Determined Contribution (NDC).

? Based on the PANLCC (2019), the **GoMG** prepared in 2021 sectoral strategies on climate change for three sectors: water, waste and industry. Similar strategies are under preparation for two additional sectors: energy (including transport) and agriculture.

? Madagascar has not submitted any Biennial Update Report (BUR) to UNFCCC yet.

? The **UNSDCF 2021-2023** entered in force in July 2021. The project is well aligned with the four strategic priorities included in the UNSDCF: (1) to strengthen good governance, rule of law and security, (2) to ensure the development of human capital, (3) to boost labor productivity and creation of productive jobs for decent income and a competitive economy, (4) to strengthen sustainable, resilient and inclusive management of the environment. The project contributes to these priorities through the deployment of environmentally friendly, affordable and efficient urban mobility with carbon-free technologies, decent jobs and reliable quality of service.

? Although the electric mobility project in Madagascar is connected to many of the **SDG targets**^[1], its more relevant contributions refer to target 3.9 (by 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination), target 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), and target 13.2 (Integrate climate change measures into national policies, strategies and planning).

? Consistency of the project with the reviewed and updated National implementation Plan for the Stockholm Convention on Persistent organic pollutants 'POPs' (**NIP**, 2017) submitted by Madagascar under Stockholm Convention on POPs. The reviewed and updated NIP includes an action for sound management of the PBDE for end-of-life electronic and transport equipment. There are also actions regarding U-POPs (Unintentional POPs including dioxins and furans) from transports emissions produced by fuel consumption. As the electric mobility project will contribute to the reduction of fuel consumption it will contribute to the reduction of U-POPs emissions.

? The former **National Development Plan** (2015-2019) identified energy and transport as key contributors to economic development. After the presidential elections, it was *de facto* replaced by the so-called *Initiative pour l'Emergence de Madagascar* (IEM), which keeps as one of its axis climate change

and energy transition. Based on the principles stated in the IEM, the GoMG is preparing a new national plan, (*Plan Emergence Madagascar 2019-2023 PEM*), which is expected to be published by the end of 2022. The project approach to transport electrification is fully consistent with the contents of the climate change and energy transition axis of the IEM.

? The last **National Transport Plan**, adopted in 2013 only provides general guidance on urban mobility, as this field is considered as the responsibility of municipalities. The MTM is preparing an Inland Transport Policy document (*Politique des Transports Terrestres, PTT*) with a 2024 horizon, which would include additional considerations on urban mobility, as well as regulatory reforms on the circulation of 2W and the provision of public transport services. The project will serve to push forward many of these reforms, and to include considerations on the use of electric vehicles.

[1] Relevant links can be claimed with SDG targets 3.9, 4.4, 5.5, 7.1, 7.2, 7.3, 7A, 7B, 8.2, 9.2, 9.3, 9A, 9B, 10.1, 11.2, 11A, 12.4, 12.7, 12A, 13.2, 13.3, 17.1, 17.3, 17.6, 17.7, 17.9.

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 team will ensure extraction and dissemination of lessons learned and good practices to enable adaptive management and upscaling or replication at local and global scales. Results will be disseminated to targeted audiences through relevant information-sharing platforms and networks. The project will contribute to scientific, policy-based and any other networks as appropriate (e.g. by providing content or enabling participation of stakeholders and beneficiaries).

The knowledge management approach integrated into the project will contribute to its overall impact, making special emphasis on lessons learned and good practices. The knowledge management activities will ensure that the knowledge generated is aligned and integrated into UNEP's knowledge management systems. This will lay the conditions for replicability and up-scaling of project activities. A list of the knowledge management deliverables expected from the project is provided in the table below. They include a knowledge management strategy and a communication and dissemination strategy (listing planned communication activities at the global, regional (platforms) and national level), to be developed at the start of the project, as well as training and awareness-raising activities targeting a variety of groups (decision-makers, transport professionals, staff), technical reports on results and lessons learnt and a project website serving as a platform for knowledge management and networking.

All communication and knowledge management activities will apply a gender sensitive approach with following principles:

? Use male and female knowledge product and public education developers for diversity of perspectives and approaches, as well as male and female reviewers of these products.

- ? Use gender sensitive language and gender balanced images (women not presented as victims but as agents of change).
- ? Whenever possible, check context and content (use gender analysis; use convincing gender arguments based on reliable sources and qualitative and quantitative data including sex disaggregated data).
- ? Refer to (inter-)national policy framework, policies, strategies and plans, as applicable and appropriate.

As a part of the Global GEF-UNEP Programme on electric mobility, the project 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 regional knowledge and investment platforms and the relevant global working groups, as well as by providing insights and knowledge. The Global Programme will facilitate access to lessons learnt and experience gained in other GEF-funded projects in Africa, such as the GEF E-Mobility Projects in Burundi, Cote d'Ivoire, Seychelles, Sierra Leone, South Africa, Tunisia and Togo and will support regional networking through a community of practice where countries and cities can share experiences and best practices.

The tools developed, best practices collected, and knowledge generated during the project will continue to be available to country and cities after the project has ended. UNEP will continue supporting the regional platform to facilitate a shift to electric mobility in Africa.

A public awareness campaign on the benefits of electric vehicles and gender-sensitive public transport services will be carried out. The project will also participate in the global conferences organized by the Global Programme to bring together all stakeholders, and any follow-up activities linked to the EU-funded SolutionPlus project[1]. A final global conference will take place at the end of the programme and will showcase progress made by the country projects and the programme more broadly. It will be an additional opportunity to exhibit the knowledge and materials generated by the global thematic platforms. It will also ensure continuation and sustainability of the programme after the 4-year project term expires and will include a press release and press conference.

Outputs	Knowledge products produced by the project (deliverables)	Indicative timeline	Indicative Budget (US\$)
Component 1			
Output 1.1	D.1.1.3. Stakeholder engagement plan of the national e-mobility subcommittee (including a gendered approach)	M6 - M9	3,828
Output 1.3	D.1.3.1. Knowledge management plan is developed and implemented	M13 - M15	4,007
Output 1.3	D.1.3.2. Capacity-building plan on e-mobility	M10 ? M12	4,007

Outputs	Knowledge products produced by the project (deliverables)	Indicative timeline	Indicative Budget (US\$)
Output 1.3	D.1.3.3. Training materials on policy aspects of e-mobility for decision-makers	M10 ? M12	4,007
Output 1.3	D.1.3.4. Training materials on technical aspects of e-mobility	M13 ? M15	4,007
Output 1.3	D.1.3.8. Training activities on e-mobility policies, standards and regulations, addressing civil servants, and public and private decision-makers	M13 ? M19	4,007
Output 1.3	D.1.3.9. Quarterly implementation reports of the training and dissemination plan	M16 ? M48	4,007
Output 1.3	D.1.3.10. Recommendations for replication in Madagascar are developed, based on the results of the Global E-mobility Programme replication event	M25 - M25	4,007
Component 2			
Output 2.1	D.2.1.5. Business models (including social impacts) developed for operators of public transport fleets in the selected corridor in Antananarivo (2&3Ws, buses).	M13 ? M18	5,042
Output 2.1	D.2.1.6. Tailored short-term recommendations to optimize operations in the corridor in Antananarivo	M18 ? M24	5,042
Output 2.2	D.2.2.5. Business models (including social impacts) developed for operators of the various public transport means in Toamasina	M13 ? M18	5,042
Output 2.2	D.2.2.6. Tailored short-term recommendations to optimize operations in Toamasina	M18 ? M24	5,042
Output 2.3	D.2.3.4. Roadmap for scaling-up the optimization and electrification of public transport lines (3Ws and buses) in Antananarivo, including a concept for bankable project to be submitted to IFIs.	M30 ? M36	9,263
Output 2.4	D.2.4.4. Roadmap for electrification of the 3W and bus fleet in Toamasina and development of a bankable business case to be submitted to IFIs.	M30 ? M36	9,263
Output 2.5	D.2.5.2. Professional training for driving and maintenance of electric 2Ws.	M13 - M15	4,000
Output 2.5	D.2.5.5. Publication of Antananarivo pilot results	M38 ? M40	9,893
Output 2.6	D.2.6.2. Professional training for driving and maintenance of electric 3Ws	M13 ? M15	4,000

Outputs	Knowledge products produced by the project (deliverables)	Indicative timeline	Indicative Budget (US\$)
Output 2.6.	D.2.6.3. Professional training for assembling of 2Ws and 3Ws	M17 - M38	9,893
Output 2.6.	D.2.6.5 Publication of Toamasina pilot results	M38 ? M40	9,893
Component 3			
Output 3.1	D.3.1.6. A consolidated package of policy proposals is presented at a workshop and submitted to the government for adoption.	M33 ? M35	4,400
Output 3.2	D.3.2.1. Guidelines for electrification of public and private fleets, including scenarios and business models for 2&3W, minibuses and buses, and industrial aspects such as assembling and maintenance	M42 - M42	5,130
Output 3.2	D.3.2.3. Final report on financial schemes to support fleet electrification	M39 ? M42	5,130
Output 3.3	D.3.3.2. Communication materials on the national e-mobility strategy	M21 ? M23	5,000
Output 3.3	D.3.3.3. Communication materials on the new regulatory and fiscal framework	M34 ? M36	5,000
Output 3.3	D.3.3.4. Communication materials on the project demonstrations' results and sustainable (including electrification) fleet management	M34 ? M39	5,000
Output 3.3	D.3.3.5. Communication materials on sustainable urban mobility, with a focus on non-motorized transport and public transport services	M37 ? M39	5,000
Component 4			
Output 4.1	D.4.1.3. Validated recommendations and technical standards to integrate renewable power with electric vehicle recharging systems are submitted to the government for implementation	M45 ? M47	1,700
Output 4.2	D.4.2.1. A report summarizing the state of the art of e-waste collection in Madagascar as well as international best practices in e-waste collection (including EV batteries) is completed after validation by local stakeholders	M34 - M39	23,000
Output 4.2	D.4.2.2. A roadmap to strengthen the e-waste management sector in Madagascar and to enable it to manage EV batteries is completed	M37 ? M40	1,000
Output 4.3	D.4.3.1. Training materials on e-waste management (with a focus on re-using and recycling EV batteries) are prepared and disseminated.	M37 - M39	2,500

The total budget for knowledge management and knowledge products is estimated at US\$ 171,110.

The project's communication plan provides the general guidance for the design, scheduling and implementation of all communication activities, as well as their monitoring and evaluation. The communication plan is established in output 3.3. (D.3.3.1) and includes the identification of the various target groups, and the key messages and communication channels adequate for each of them. The communication materials are prepared within output 3.3. and the communication campaigns are implemented in output 3.4.

[1] <https://www.solutionsplus.eu/>. The project will close in December 2023.

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 (MEDD) and the Implementing Agency. The project M&E plan foresees a Terminal Evaluation (TE), worth USD 30,000 and an optional mid-term review with a budget of USD 15,000. In addition, USD 3,000 have been provisioned to organize the project's Inception Workshop and USD 8,000 for the project Steering Committee Meetings. Finally, USD 1,133 have been budgeted for other M&E costs (data and information collection, printing, etc.). Therefore, the total M&E budget is amounting to USD 57,133.

The project M&E plan is consistent with the GEF Monitoring and Evaluation policy. 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. The 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. The 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 GEF Evaluation requirements and UNEP's Evaluation Policy, all GEF funded projects are subject to a performance assessment when they reach operational completion. This performance assessment will be either an independent Terminal Evaluation or a management-led Terminal Review.

In case a Review is required, the UNEP Evaluation Office will provide tools, templates, and guidelines to support the Review consultant. For all Terminal Reviews, the UNEP Evaluation Office will perform a quality assessment of the Terminal Review report and validate the Review's performance ratings. This quality assessment will be attached as an Annex to the Terminal Review report, validated performance ratings will be captured in the main report.

However, if an independent Terminal Evaluation (TE) of the project is required, the Evaluation Office will be responsible for the entire evaluation process and will liaise with the Task Manager and the project implementing partners at key points during the evaluation. 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. 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 (or the management-led review) 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 in relation to the submission of the follow-on proposal.

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 compliance performance

against the recommendations is then reported to senior management on a six-monthly basis and to member States in the Biennial Evaluation Synthesis Report.

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 57,133.

Type of M&E activity	Responsible Parties	Budget from GEF	Budget co-finance	Time Frame
Inception Workshop	Executing Agency (CTA)	\$ 3,000 (catering and venue)		Within 2 months of project start-up
Inception Workshop Report	Executing Agency (CTA)	Part of the CTA duties		3-4 weeks after the Inception Workshop
Measurement of project progress and performance indicators	Executing Agency (CTA)	Part of the CTA duties		Annually, as part of the PIR
Baseline measurement of project outcome indicators, GEF Core indicators	Executing Agency (CTA)			Included in Annex A of the CEO Endorsement Document
Mid-point measurement of project outcome indicators, GEF Core indicators	Executing Agency (CTA)	Part of the CTA duties		Mid-Point (as part of the MTR or the PIR process)
End-point measurement of project outcome indicators, GEF Core indicators	Executing Agency (CTA)	Part of the CTA duties		End Point (as part of the final PIR, Final Report or TE)
Half-Yearly Progress Reports	Executing Agency (CTA)	Part of the CTA duties		Within 1 month of the end of reporting period i.e. on or before 31 January and 31 July

Type of M&E activity	Responsible Parties	Budget from GEF	Budget co-finance	Time Frame
Project Steering Committee (PSC) meetings	Executing Agency (CTA and National Project Director)	US\$ 8,000 (8 PSC meetings, 2 per year. US\$ 10,00 per meeting)	Venue to be co-financed by EA (EA meeting or conference room)	Twice a year
Reports of PSC meetings	Executing Agency (CTA)	Part of the CTA duties		2 weeks after PSC meeting
Project Implementation Review (PIR) report	Executing Agency (CTA) and UNEP (Task Manager)	Part of the CTA duties		Annually, part of reporting routine
Implementation and Monitoring of the Gender Action Plan and Social / Environmental Safeguards	Executing Agency (CTA as responsible for social, environmental and gender safeguards)	Part of the CTA duties		Annually, part of reporting routine
Monitoring visits to field sites	Executing Agency			As appropriate
Mid Term Review (MTR) <i>optional</i>	UNEP Evaluation Office, with the support of the UNEP Task Manager and the Executing Agency	US\$ 15,000		At mid-point of project implementation, if deemed required by the Task Manager
Quarterly expenditure reports	Executing Agency (CTA)	Part of the CTA duties		Within 1 month of the end of reporting period i.e. on or before 31 January, 30 April, 31 July and 31 October
Annual Inventory of Non-expendable equipment	Executing Agency (CTA)	Part of the CTA duties		Annually, as at 31 December of each year, to be submitted within 2 months
Co-financing report	Executing Agency (CTA), co-finance partners	Part of the CTA duties		Annually, on or before 31 July

Type of M&E activity	Responsible Parties	Budget from GEF	Budget co-finance	Time Frame
UNEP Final Report	Executing Agency (CTA)	Part of the CTA duties		Within 2 months of the project completion date
Publication of Lessons Learnt and other project documents	Executing Agency (CTA)	Part of the CTA duties		Part Final Report
Terminal Evaluation (TE)	UNEP Evaluation Office, with the support of the UNEP Task Manager and the Executing Agency	US\$ 30,000		Initiated at the project's technical completion
Other M&E costs (data and information collection, printing, etc.)	Executing Agency	US\$ 1,133		As required by M&E activities
Total		US\$ 57,133		

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)?

By transitioning from a mobility-model based on imported fossil fuels to one based on renewable energy powered electric mobility, Madagascar stands to reap the following socio-economic benefits:

- ? Improved public health from reduced local air and noise pollution and a commensurate reduction in air pollution associated healthcare costs in the main cities.
- ? Development of new policy frameworks to underpin electric mobility is a key opportunity to improve urban public transport and road safety, in accordance with the recommendations set up in the PANLCC and in the SDT for Antananarivo. This would contribute to reduced congestion and better quality of life with less time spent in traffic and better accessibility to jobs, health care and other services to all, including low-income groups.
- ? The evaluation and development of strategies to ensure non-discriminatory access to opportunities created by electric mobility will go a long way in bridging the gender disparity in mobility from employment, investment and access of services.

- ? Reduced exposure to oil price volatility & reduced oil imports, with improved energy security.
- ? New opportunities for the development of the national industry, linked to EV technologies, such as local EV manufacturers, end-of-life vehicle and battery management, and urban mobility providers.
- ? Potential to improve living conditions and reduce inequality by providing cleaner, reliable and affordable transport options.
- ? Reinforced capacities in the sector, including decision-makers, professionals and operators.
- ? New industrial development opportunities associated to local assembling of electric vehicles and to the management of e-waste.

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 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.

Supporting Documents

Upload available ESS supporting documents.

Title	Module	Submitted
10275_EM Madagascar_SRIF	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-Term Project Target	End of project Target	Means of Verification	Assumptions & Risks	Responsible Party for M&E Activities	UNEP MTS reference
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 2023 - 2038	Baseline A: 0	Mid-term target A: N/A	End-of-project target A: Direct: 751,063 tCO2 Indirect: 1,751,370 tCO2 (over the 2024-2038 period)	Calculation based on UNEP Emob calculator. PIR, MTR and TE.	Based on adoption of policies and introduction of financial mechanism. Assumption: adoption of policies and introduction of financial mechanism by the Government of Madagascar Risk: Change in leadership or priorities in the government. Investments	MEDD, PMU	UNEP MTS 2022-2025 Climate stability: Countries increasingly transition to low-emission economic development pathways 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-term project target B: Women: 4,820 Men: 3,220 Total: 8,040	End-of-project target B: Women: 12,052 Men: 8,210 Total: 20,262	Attendance sheets from the project and the Global E-mobility Programme activities and indicator 2.1. PIR, MTR and TE.		MEDD, PMU	

	Indicator C: MJ of energy saved	Baseline C: 0	Mid-term target C: N/A	End-of-project target C: 31.36 billion MJ (over the 2024-2038 period)	Calculation based on UNEP Emob calculator . PIR, MTR and TE.	envisaged in renewable energy projects fail to materialize.	MEDD, PMU	
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Project Outcomes	Outcome level Indicators	Baseline	Mid-Term Project Target	End of project Target	Means of Verification	Assumptions & Risks	Responsible Party for M&E Activities	MTS Expected Accomplishment
Outcome 1: The government establishes an institutional framework and adopts a strategy for the promotion of low-carbon electric mobility	Indicator 1.1: The national e-mobility subcommittee is established and operational	Baseline 1.1: No institutional framework in place	Mid-term target 1.1: National e-mobility subcommittee is established and meets on a quarterly basis	End-of-project target 1.1: Institutional framework established by the government through decree or other appropriate piece of legislation and members and supporting staff appointed.	Government announcement (PMU). PIR, MTR and TE.	Assumptions: Based on on-going government support Risks: Lack of support to the e-mobility strategy due to poor involvement of key stakeholders or to lack of consideration of the mobility needs of women	MEDD	Outcome 1B: Countries and stakeholders have increased capacity, finance and access to technologies to deliver on the adaptation and mitigation goals of the Paris Agreement.

	Indicator 1.2: The GoMG endorses a national gender-sensitive strategy to promote low-carbon electric mobility	Baseline 1.2: No national gender-sensitive e-mobility strategy in place	Mid-term target 1.2: Draft gender-sensitive national e-mobility strategy validated at a workshop	End-of-project target 1.2: National gender-sensitive e-mobility strategy approved by the government	Government announcement (PMU). PIR, MTR and TE.	and socially marginalized groups.	MEDD, PMU	
	Indicator 1.3: Number of decision-makers trained on e-mobility through national and global activities (women and men)	"Baseline 1.3: 0	Mid-term target 1.3: 5 women and 5 men	End-of-project target 1.3: 10 women and 10 men	Attendance list to training events (PMU). PIR, MTR and TE.		MEDD, PMU	
Outcome 2: Demonstrations provide evidence of technical, financial and environmental sustainability to plan for scale-up of low-	Indicator 2.1: Estimated number of users (women and men) of services provided by electric 3Ws in Toamasina.	Baseline 2.1: 0	Mid-term target 2.1: 8,000 users of which at least 4,800 women.	End-of-project target 2.1: 20,000 users of which at least 12,000 women.	Fleet tracking system, reports from operator(s) and survey. PIR, MTR and TE.	Assumptions: Based on 20 trips daily provided by each 3W and an average occupancy of 2 pass. per trip, 20 days of operation per month and regular	Municipality of Toamasina, PMU	Outcome 1B: Countries and stakeholders have increased capacity, finance and access to technologies to deliver on the adaptation and mitigation

<p>carbon electric mobility, including in optimized public transport bus services</p>	<p>Indicator 2.2: Number of governmental institutions and public and private companies planning to purchase e-vehicles for their fleets in the next 2 years</p>	<p>Baseline 2.2: 0</p>	<p>Mid-term target 2.2: 0</p>	<p>End-of-project target 2.2: 2</p>	<p>Questionnaire or survey to a sample of fleet operators in Antanarivo and Toamasina. PIR, MTR and TE.</p>	<p>users riding an EV at most twice a month. Women more sensitive to better quality of service than men. The project properly disseminates and communicates the results of the demo project; Charging infrastructure is available; EV costs decrease; EV manufacturers considering Madagascar as a market for their vehicles. Risks: Exposure and vulnerability to climate change of electricity supply, charging stations and public transport services. Inappropriate behavior</p>	<p>Municipality of Antanarivo, Municipality of Toamasina, MTM, PMU</p>	<p>goals of the Paris Agreement.</p>
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						of 3W drivers operating the vehicles provided by the project. Working conditions in the 2&3W services operated within the project do not meet national or labor laws and international labor commitments.		
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Project Outcomes	Outcome level Indicators	Baseline	Mid-Term Project Target	End of project Target	Means of Verification	Assumptions & Risks	Responsible Party for M&E Activities	MTS Expected Accomplishment
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Outcome 3: Conditions are created to shift market towards low-carbon electric mobility and accelerate introduction of appropriate electric vehicles in Madagascar	Indicator 3.1: The regulatory package to incentivize the uptake of electric mobility is validated by national coordination platform and submitted to the government for adoption	Baseline 3.1: No regulations on electric vehicles	Mid-term target 3.1: N/A	End-of-project target 3.1: Regulations on taxation and technical specifications submitted to the government for adoption	Minutes of the national e-mobility coordination platform Government's announcement. PIR and TE.	Assumptions: Based on ongoing government support and successful demonstration project. Favourable political climate to the introduction of electric public transport modes; relevant Ministries are properly involved in the project through the national coordination platform.	MTM MTM, PMU	Outcome 1B: Countries and stakeholders have increased capacity, finance and access to technologies to deliver on the adaptation and mitigation goals of the Paris Agreement.
	Indicator 3.2: Number of business models for electric vehicles in fleets that are recognized as being viable by key stakeholders	Baseline 3.2: 0	Mid-term target 3.2: 0	End-of-project target 3.2.: 2	Government announcement (PMU). PIR and TE.	Risks: Negative perception of e-mobility technology and its benefits for Madagascar by key stakeholders (including the		

	Indicator 3.3: Number of financing schemes for the procurement of electric vehicles offered by the financial sector	Baseline 3.3: No financing schemes adapted to EVs	Mid-term target 3.3: N/A	End-of-project target 3.3: 1 financial scheme available in local financial institutions	Business / financing model Procurement guideline document LOIs from financial institutions Government gazette and other publications. PIR and TE.	financial sector) and the public. Slow reforms in the public transport sector discourage operators to invest in EVs . Market appetite for cheap second-hand ICE vehicles jeopardize the implementation of regulatory reforms	MTM, PMU	
Outcome 4: Measures are developed to ensure the long-term environmental sustainability of low-carbon	Indicator 4.1: Volume of end-of-life batteries (by category) successfully collected in Toamasina	Baseline 4.1: 0	Mid-term target 4.1: 0	End-of-project target 4.1: 200 kg	Reports by the e-waste recycling companies. PIR and TE.	Assumptions: Interest by e-waste collection companies to collect and treat of used EV batteries; sufficient capacity in the waste management sector to enable the	MEDD, Municipality of Toamasina, PMU	Outcome 1B: Countries and stakeholders have increased capacity, finance and access to technologies to deliver on the adaptation and mitigation

electric mobility	Indicator 4.2: Number of women and men trained of ELV management	Baseline 4.2: 0	Mid-term target 4.2: 0	End-of-project target 4.2: 6 women and 34 men	Lists of attendance. PIR and TE.	re-use of used batteries. Governmental support to the development of waste management in the EV and batteries sector. Risks: Reliability of electricity supply can deteriorate by a growing demand from electric vehicles. The reduced number of vehicles to be recycled in the short-term weakens the commitment of recycling companies.	MEDD, PMU	goals of the Paris Agreement.
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The indicators outlined in the Table below will serve to monitor gender mainstreaming within project activities (refer to the dedicated section on Gender mainstreaming):

Project Components / Outputs	Gender mainstreaming Objectives	Gender mainstreaming Activities / Indicators	Targets / Means of Verification (MoV)	Responsibility
Project Objective	Maximizing project's impact on women	Core indicator B. Number of project's beneficiaries (men and women).	12,055 women (59% of total beneficiaries) MoV: Surveys and attendance lists	PMU
Overall Project Management	Gender considerations in key project's decisions	Activity: PSC meetings. Indicator: Attendance of CNFM to PSC meetings.	Target: CNFM participates at all PSC meetings MoV: List of attendance	CNFM
	Regular project reporting addresses gender	Activity: Completion of annual PIR. Indicator: Number of gendered indicators reported in the PIR.	Target: PIR includes 100% of indicators from the PRF (Annex A) MoV: PIR	PMU
Component 1 Output 1.1	Gender considerations are discussed at the e-mobility subcommittee	Activity: E-mobility subcommittee meetings. Indicator: Percentage of meetings including gender issues in their agenda	Target: 50% of meetings MoV: Meeting reports	PMU
Component 1 Output 1.2	Contributions of electrification to gender equality identified	Activity: Gender-sensitive electric mobility strategy. Indicator: The e-mobility strategy includes a section on gender mainstreaming	Target: Gender section completed MoV: National e-mobility strategy	PMU
Component 1 Output 1.3	E-mobility training of decision makers prioritize women	Activity: Identification of potential participants in e-mobility training Indicator: Percentage of female participants	Target: 10 women (50% of attendants) MoV: Gender disaggregated attendance sheets	PMU

Project Components / Outputs	Gender mainstreaming Objectives	Gender mainstreaming Activities / Indicators	Targets / Means of Verification (MoV)	Responsibility
Component 2 Outputs 2.5 and 2.6	PT services adapted to women's needs	Activity: PT services during the demonstration in Toamasina integrate a gender perspective Ind. 2.1: Estimated number of female users of services provided by e3Ws in Toamasina.	Target: 60% of users MoV: Operators' reports and survey	PMU
Component 2 Output 2.5 and 2.6	Pilots advance participation of women in the 3W demonstration	Activity: Gender issues embedded in ToR for training and selection of EV staff Indicator: Number of women receiving professional training and engaged in the operation of EV in the demonstration fleets	Target: 15% of female trainees and drivers MoV: List of attendance and reports from operators	PMU
Component 2 Output 2.5 and 2.6	Progress in gender equality highlighted in the pilot communication materials	Activity: Section on gender within all communication materials about the pilot. Indicator: % of basic information including population data (tables and graphics) providing gendered information	Target: At least 75% of basic information is gender-sensitive MoV: Contents of the pilot communication materials	PMU
Component 3 Output 3.3	Mainstreaming gender in project communication materials	Activity: Integration of a gender perspective in communication materials. Indicator: Chapter on mainstreaming gender in the communication plan	Target: Communication plan includes gender chapter MoV: Communication plan	PMU

Project Components / Outputs	Gender mainstreaming Objectives	Gender mainstreaming Activities / Indicators	Targets / Means of Verification (MoV)	Responsibility
Component 3 Output 3.4	Women's mobility challenges explicitly addressed by communication activities	Activity: Quarterly reports on communication activities. Indicator: % of quarterly reports providing gender-disaggregated information on communication activities	Target: 50% of quarterly reports provide gender-disaggregated information MoV: Quarterly reports	PMU
Component 4 Output 4.3	Women gain access to professional training in e-waste management	Activity: Women are prioritized in training activities on end-of-life EV management Ind. 4.2: Number of women professionally trained on end-of-life EV management.	Target: 15% of female trainees MoV: List of attendance	PMU
Across all Components	Promote women participation in all project consultation and decision-making activities.	Activity: The participation of female representatives will be encouraged in all project consultation and decision-making activities outlined in the Workplan (refer to Annex L for more details) through a gender-sensitive outreach to stakeholders. Indicator: Average % of female participants attending the project consultation and decision-making meetings	Target: At least 30% of female participants in consultation and decision-making meetings MoV: Gender-disaggregated attendance sheets	PMU

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 in the "Documents" section of the GEF Portal which includes all responses to the GEF Secretariat, STAP and Council comments to the PFD.

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 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 be 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 N₂O 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 N₂O) 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:

- o Open competition and define the situations in which other less competitive methods can be used; and*
- o 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, hereby 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, Office 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/noroutyouanner-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 EVs 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 EVs 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 country's NDC and its strong commitment to the introduction of clean and sustainable energies.

v Comment by Lauren Celine Naville Gissels, 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 PM_{2.5}, 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\$ 50,000			
<i>Project Preparation Activities Implemented</i>	<i>GETF/LDCF/SCCF Amount (US\$)</i>		
	<i>Budgeted Amount</i>	<i>Amount Spent to date</i>	<i>Amount Committed</i>
GHG modelling consultant	4,571.95	4,571.95	0
Project development consultant fees and travel	26,715.71	26,707.12	0
Legal agreement with Ministry of Environment for organization of local stakeholder consultation workshops	10,100.00	10,100.00	0
-			
Total	41,387.66	41,379.07	0

At the end of the project development phase, there is an unused amount of US\$ 8,620.93 from the PPG. In line with GEF policies on the matter, these unspent PPG funds will be returned to the Trustee by UNEP.

If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue to undertake exclusively preparation activities up to one year of CEO Endorsement/approval date. No later than one year from CEO endorsement/approval date. Agencies should report closing of PPG to Trustee in its Quarterly Report.

ANNEX D: Project Map(s) and Coordinates

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



Demonstration sites	Latitude	Longitude
Antananarivo	18.8792? S	47.5079? E
Toamasina	18.1443? S	49.3958? E

ANNEX E: Project Budget Table

Please attach a project budget table.

GEF budget category & detailed description	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Subtotal	M&E	PMC	Total	Responsible entity
02. Goods		245,000	20,000		265,000			12,678	277,678
Computer and other ICT equipment for the PMU					0		12,678	12,678	MEDD
Computer-aided public transport supervision system in Antananarivo		25,000			25,000			25,000	MEDD
Computer-aided public transport supervision system in Toamasina		25,000			25,000			25,000	MEDD
Printing of training and communication materials			20,000		20,000			20,000	MEDD
Procurement and 2-year maintenance of a fleet of electric motorbikes for the local police in Antananarivo		75,000			75,000			75,000	MEDD
Procurement and installation of charging systems in Antananarivo		35,000			35,000			35,000	MEDD
Procurement and installation of charging systems in Toamasina		35,000			35,000			35,000	MEDD
Procurement, installation and 2-year maintenance of fleet monitoring system for the pilot fleet in Toamasina		25,000			25,000			25,000	MEDD
Procurement, installation and 2-year maintenance of fleet monitoring system for the pilot fleets in Antananarivo		25,000			25,000			25,000	MEDD
04. Grants/Subgrants		75,000		10,000	85,000			85,000	
Incentives for e-waste management services in Toamasina				10,000	10,000			10,000	MEDD
Incentives for scrapping and replacing 3Ws by electric ones in Toamasina		75,000			75,000			75,000	MEDD
06. Sub-contract to executing partner/entity	5,000	8,500	7,000	4,500	25,000			25,000	
International E-mobility Technical Support (UNEP SMU)	2,500	5,000	4,500	2,000	14,000			14,000	UNEP SMU
Travel to provide international E-mobility Technical Support (UNEP SMU)	2,500	3,500	2,500	2,500	11,000			11,000	UNEP SMU
07. Contractual services (company)			40,000		40,000		8,000	48,000	
Implementation of communication campaigns			20,000		20,000			20,000	MEDD
Independent financial audits					0		8,000	8,000	MEDD
Project website design, implementation and management			20,000		20,000			20,000	MEDD
09. International Consultants	34,500	57,000	23,250	46,500	161,250	45,000		206,250	
International consultant (or firm) for preparation of energy system integration study				24,000	24,000			24,000	MEDD
International consultant (or firm) on EV and EV charging system technologies and urban mobility	750	57,000	750		58,500			58,500	MEDD
International consultant (or firm) on management of EV batteries and other e-waste at end of life				22,500	22,500			22,500	MEDD
International consultant (or firm) on policy and strategy	33,750		22,500		56,250			56,250	MEDD
Optional Mid-Term Review (UNEP Evaluation Office)					0	15,000		15,000	UNEP EO
Terminal Evaluation					0	30,000		30,000	UNEP EO
10. Local Consultants		58,000		3,000	61,000			61,000	
National consultant to support project demonstrations in Antananarivo		29,000			29,000			29,000	MEDD
National consultant to support project demonstrations in Toamasina		29,000		3,000	32,000			32,000	MEDD
11. Salary and benefits/Staff Costs	34,510	49,640	49,150	11,100	144,400		27,200	171,600	
Chief Technical Advisor	17,510	15,640	16,150	5,100	54,400		27,200	81,600	MEDD
Junior outreach specialist	13,000	3,000	29,000		45,000			45,000	MEDD
Junior technical specialist	4,000	31,000	4,000	6,000	45,000			45,000	MEDD
12. Training, Workshops, Meetings	43,000	44,000	4,000	4,000	95,000	11,000	10,000	116,000	
Catering costs, transport allowances and other support for PSC meetings					0	8,000		8,000	MEDD
Catering, venue and support for inception workshop					0	3,000		3,000	MEDD
Meetings and consultations workshops of the PMU					0		10,000	10,000	MEDD
Venue, catering and support for demonstration design workshops		4,000			4,000			4,000	MEDD
Venue, catering and support for Local Advisory Group meetings		32,000			32,000			32,000	MEDD
Venue, catering and support for training of demonstration staff		8,000			8,000			8,000	MEDD
Venue, catering and support for training workshops on e-mobility	4,000				4,000			4,000	MEDD
Venue, catering and support for workshop on e-waste management				4,000	4,000			4,000	MEDD
Venue, catering and support for workshops on regulations and financing			4,000		4,000			4,000	MEDD
Venue, catering, support and travel allowances for intersectoral e-mobility subcommittee meetings	36,000				36,000			36,000	MEDD
Venue, catering, support and travel allowances for validation workshop of the national e-mobility strategy	3,000				3,000			3,000	MEDD
13. Travel	78,000	12,000	6,000	9,000	105,000		16,000	121,000	
Attendance of training and coordination activities of Global Programme	72,000				72,000			72,000	MEDD
Travel and DSA for the PMU members					0		16,000	16,000	MEDD
Travel for missions of the consultancy on energy system integration				3,000	3,000			3,000	MEDD
Travel for missions of the consultancy on EV and EV charging system technologies and urban mobility		12,000			12,000			12,000	MEDD
Travel for missions of the consultancy on management of EV batteries and other e-waste at end of life				6,000	6,000			6,000	MEDD
Travel for missions of the consultancy on policy and strategy	6,000		6,000		12,000			12,000	MEDD
14. Office supplies					0		8,000	8,000	
Office supplies and consumables					0		8,000	8,000	MEDD
15. Other operating costs					0	1,133	22,000	23,133	
Administrative support to the PMU					0		18,000	18,000	MEDD
Other M&E costs (data and information collection, printing, etc.)					0	1,133		1,133	MEDD
Other operating costs of the PMU (phone, internet data, printing costs, etc.)					0		4,000	4,000	MEDD
Grand Total	195,010	549,140	149,400	88,100	981,650	57,133	103,878	1,142,661	

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.

N/A

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 Agency 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.

N/A

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).

N/A