Funding Proposal

FP189: E-Mobility Program for Sustainable Cities in Latin America and the Caribbean

Multiple Countries | Inter-American Development Bank (IDB) | Decision B.33/08

9 August 2022

GREEN CLIMATE FUND

Contents

Note to Accredited Entities on the use of the funding proposal template

- Accredited Entities should provide summary information in the proposal with cross-reference to annexes such as feasibility studies, gender action plan, term sheet, etc.
- Accredited Entities should ensure that annexes provided are consistent with the details provided in the funding proposal. Updates to the funding proposal and/or annexes must be reflected in all relevant documents.
- The total number of pages for the funding proposal (excluding annexes) **should not exceed 60**. Proposals exceeding the prescribed length will not be assessed within the usual service standard time.
- The recommended font is Arial, size 11.
- Under the GCF Information Disclosure Policy, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Accredited Entities are asked to fill out information on disclosure in section G.4.

Please submit the completed proposal to:

fundingproposal@gcfund.org

Please use the following name convention for the file name:

"FP-[Accredited Entity Short Name]-[Country/Region]-[YYYY/MM/DD]"

A. PROJECT/PROGRAMME SUMMARY

A.1. Project or programme	Programme	**A.2. Public or private sector**	Public
A.3. Request for Proposals (RFP)	Not applicable		

A.4. Result area(s)

*Check the applicable GCF result area(s) that the overall proposed project/programme targets below. For each checked result area(s), indicate the estimated percentage of **GCF and Co-financers' contribution** devoted to it. The total of the percentages when summed should be 100% for GCF and Co-financers' contribution respectively.*

	GCF contribution	Co-financers' contribution[1]
Mitigation total	Enter number %	Enter number %
☐ Energy generation and access	Enter number %	Enter number %
☒ Low-emission transport	39 %	61 %
☐ Buildings, cities, industries and appliances	Enter number %	Enter number %
☐ Forestry and land use	Enter number %	Enter number %
Adaptation total	Enter number %	Enter number %
☐ Most vulnerable people and communities	Enter number %	Enter number %
☐ Health and well-being, and food and water security	Enter number %	Enter number %
☒ Infrastructure and built environment	76 %	24 %
☐ Ecosystems and ecosystem services	Enter number %	Enter number %

A.5. Expected mitigation outcome *(Core indicator 1: GHG emissions reduced, avoided or removed / sequestered)*	7,547,602 tCO2eq	**A.6. Expected adaptation outcome** *(Core indicator 2: direct and indirect beneficiaries reached)*	*8,890,000*	
			1,446,298	*7,443,703*
			1.4%	*9%*
A.7. Total financing (GCF + co-finance[2])	450,000,000 USD	**A.9. Project size**	Large (Over USD 250 million)	
A.8. Total GCF funding requested	200,000,000 USD			

[1] Co-financer's contribution means the financial resources required, whether Public Finance or Private Finance, in addition to the GCF contribution (i.e. GCF financial resources requested by the Accredited Entity) to implement the project or programme described in the funding proposal.
[2] Refer to the Policy of Co-financing of the GCF.

A.10. Financial instrument(s) requested for the GCF funding	*Mark all that apply and provide total amounts. The sum of all total amounts should be consistent with A.8.* ☒ Grant 55,000,000 USD ☒ Loan 145,000,000 USD ☐ Guarantee Enter number ☐ Equity Enter number ☐ Results-based payment Enter number		
A.11. Implementation period	6 years	**A.12. Total lifespan**	30 years
A.13. Expected date of AE internal approval	IDB approval of the program will follow GCF board approval *10/30/2022*	**A.14. ESS category**	B
A.15. Has this FP been submitted as a CN before?	Yes ☒ No ☐	**A.16. Has Readiness or PPF support been used to prepare this FP?**	Yes ☐ No ☒
A.17. Is this FP included in the entity work programme?	Yes ☒ No ☐	**A.18. Is this FP included in the country programme?**	Yes ☒ [3] No ☐
A.19. Complementarity and coherence	*Does the project/programme complement other climate finance funding (e.g. GEF, AF, CIF, etc.)? If yes, please elaborate in section B.1.* Yes ☒ No ☐		
A.20. Executing Entity information	See Section B.4 of this Funding Proposal.		

A.21. Executive summary (max. 750 words, approximately 1.5 pages)

Climate vulnerability context: Latin America and the Caribbean (LAC) is one of the most vulnerable regions to the impacts of climate variability and change. This is due to its socio-economic context[4] and its already high exposed populated areas, infrastructure, and ecosystems to multiple climate related hazards, such as tropical cyclones, heatwaves, droughts, floods, among others. According to a recent United Nations Office for Disaster Risk Reduction (UNDRR) report, nine out of ten people in this region affected by disasters were impacted by climatic events (mostly floods). Climate change medium-term impacts will include desertification, rapid glacier retreat, longer periods of hotter weather, lower and/or extreme rainfall, intensification of the La Niña or El Niño phenomena, sea level rise and a likely increase in the intensity and frequency of tropical cyclones. Data between 1998 and 2017 indicate that 53% of global economic losses from climate-related disasters occurred in LAC (RAR,2021). As urban areas continue to grow in this region, disaster risks linked to climate change will be an important element to be considered in the planning and design of cities and their key infrastructure such as urban transport systems. Thus, building climate-resilient infrastructure has

[3] As of March 21st 2022, only Country programmes of Uruguay and Jamaica are available on GCF website. Both include reference to this FP.

been identified as one of the key adaptation priorities in most of LAC countries' Nationally Determined Contributions (NDCs).

Greenhouse gases (GHG) emissions context: Transport contributes to almost one-quarter of the current global energy-related GHG emissions and is growing faster than any other energy end-use sector. GHG emissions from the transport sector are anticipated to rise from today's levels by nearly 20% by 2030 and close to 50% by the year 2050 unless major action is undertaken. Between 2000 and 2018 the total GHG emissions of the participating countries grew on average annually 1.5% whilst transport emissions in the same period grew annually by 2.8%.

The **average carbon intensity of electricity** generated by Program countries is 0.243 $kgCO_{2e}$/kWh which allows electric vehicles (EVs) to reduce GHG emissions on a well-to-wheel (WTW) base by around 80% compared to fossil units. As countries are progressing towards decarbonization of their power supply, reductions of GHG will be even larger.

Cities are suffocated by bad air: Air pollution is a major problem in most Latin American cities with levels affecting seriously human health. The population of major cities of participating countries is exposed to levels of air pollutants that significantly surpass WHO guideline levels. The WHO estimates that annually 4.2 million deaths result due to excessive exposure to fine particulate matter equivalent to 7.6% of all deaths[5]. The transport sector is a major source of air pollution.

Baseline trends: Fossil vehicles will continue to dominate the landscape as electric vehicles (EVs) remain, even with decreasing prices, financially and from the convenience point of view not yet sufficiently attractive to be commercially viable. Public transport (PT) mode share is also expected to continue to decline. The result of this Business as Usual (BAU) scenario is that by 2030 transport emissions will be significantly higher than their current level with air pollution remaining at very high levels as the impact of new vehicle emission standards is offset by increased vehicle numbers and a mode shift towards private and more polluting vehicles.

Transformational change is required: Limiting the global temperature increase to below 2 degrees Celsius requires changing this transport emissions trajectory, which includes as core components the development of an integrated electromobility ecosystem (Paris Declaration on Electro-Mobility and Climate Change & Call to Action, 2015) and the fostering of public and non-motorized transport (NMT). The Paris Declaration on Electro-Mobility calls for the deployment of EVs compatible with a 20% share of all road transport vehicles in 2030. To achieve this goal, the International Energy Agency (IEA) modelling indicates that EVs need to represent 35% of global sales in 2030. EV deployment is however still at an infant stage in all Program countries. Closing the gap between the BAU reality and the target requires policy changes and corrective market interventions. Additionally, and in connection to the climate vulnerability context described above, as climate change-related risks continue to materialize, additional challenges will appear to effectively manage sustainable urban development. This will be further aggravated by the effects of forced migration and a growing incidence of systemic risk overall (RAR, 2021). Along these lines, and to support countries in LAC to build sustainable climate-resilient and carbon-neutral development pathways, infrastructure for electrified urban transport need to manage observed and anticipated climate impacts throughout its design, operation, and maintenance.

The main **motivating forces** to foster e-mobility are to (i) reduce GHG emissions; (ii) improve air quality and reduce health problems associated with air pollution; (iii) reduce dependency on imported fossil fuels and exposure to external price shocks; (iv) capture a positive economic impact related to reduced health costs, reduced fuel import bills and job creation, v) increase climate resilience of urban and grid infrastructure, and (vi) assess option of the hydrogen economy for the country. The majority of NDCs of Program countries specifically mention EVs as an important measure to achieve climate targets. Many countries have also initiated policies to foster the deployment of EVs.

Barriers to massive EV deployment are primarily: (i) limited commercial viability of EV investments related to high upfront costs, low or negative profitability, long payback times and possible loss of income if assets cannot perform at the equal level as fossil units; (ii) business models and policies which are not conducive to a mass EV deployment; (iii) (iii) limited know-how on climate risk assessments that quantify the severity and frequency of potential extreme climate-related events that can happen in the future and impact the IEUTS, and limited experience with cost-effective measures

[4] The region has the greatest disparity in income distribution in the world. According to ECLAC, the percentage of extreme poverty increased from 7.8% to 11.3% of the population and that of poverty rose from 27.8% to 30.5% between 2014 and 2019. In these last two years due to the COVID-19, poverty and extreme poverty levels have increased even further.
[5] https://www.who.int/gho/phe/en/

to increase the resilience of urban transport infrastructure; and (iv) lack of financial support for investments to reduce climate vulnerability of urban transport infrastructure.

The E-Mobility Program links EV deployment with sustainable low-carbon urban development and increased climate resilience of urban transport infrastructure and the grid (*Integrated Electrified Urban Transport Systems*, IEUTS).[6] Sustainable urban development includes measures to strengthen and improve the public transport (PT) sector, NMT, electric micro-mobility and measures to increase the quality of life of city centers with a gender sensitive approach while responding to observed and anticipated climate-related risks associated to more intense precipitation and flooding, heat waves, sea level rise and more intense and frequent hurricanes. The focus of the Program is on commercial e-mobility including buses, taxis, institutional fleets, trucks and vessels. Private usage vehicles such as private passenger cars and motorcycles are not fostered. Program components are **(i) climate resilient transport infrastructure**; **(ii) increase climate resilience of grid with green hydrogen and vehicle to grid (V2G) pilot projects: (iii) electrified integrated urban mobility and (iv) technical assistance.** All projects will review all type of hazards to which the IEUTS is exposed OBJOBJ in cities in LAC, with emphasis on climate-related hazards such as intense precipitation and flooding, extreme heat, sea level rise, hurricanes and strong winds. The results of the screening will determine the need for a qualitative or quantitative disaster (see Annex 2b) and climate risk assessment that will guide the identification, prioritization and design of specific adaptation measures to reduce climate vulnerability and risk of the *IEUTS* to these hazards. In Component 2 green hydrogen pilot projects shall include the entire value chain and is for transportation usage (preferable trucks, vessels or mobile machinery) and include piloting the usage of hydrogen for energy storage and explore the potential of hydrogen storage to increase the grid resilience whilst V2G projects explore the option of linking EV deployment with renewable energy deployment whilst increasing the grid resilience with a focus on Small Island Developing States (SIDS) which are highly vulnerable to more intense and frequent hurricanes. Technical Cooperation assistance under Component 4 includes consulting services related to the establishment of a conducive e-mobility framework at project/local level (e.g. business models which favor EV deployment), at national level (e.g. public transport electrification roadmaps) and at a regional level to foster the interchange of experiences and know-how facilitated by a Resource Center (Regional Sector Skills Council for Electromobility) common to all participating countries; and activities to build institutional adaptive capacity such as customized training to enhance the operation and maintenance of assets financed by the Program. Component 4 includes a comprehensive gender action plan to ensure that the Program components and projects consider the differentiated needs and travel patterns between women and men when using public transportation and transport infrastructure during the design and implementation of the activities, increase access to economic opportunities for women in the electromobility sector. Additionally, this component will also include activities to improve existing planning and design methodologies and processes to integrate and manage uncertainty in the decision-making; a knowledge management strategy (KMS) will be developed to gather, synthetize and apply lessons learned and practical experiences on climate risk management, aiming at creating benchmarks, regulations and/or norms at the city level for designing and operating climate resilient IEUTS.

Financial instruments will be concessional loans (Sovereign Investment Loans) and grants (Investment Grants) for components 1, 2, and 3 of the Program, which will be formalized through Subsidiary Agreements[7]. Also, GCF resources will be used for non-reimbursable Technical Cooperation activities for Component 4 of the Program executed by an EE under a prior Subsidiary Agreement or, where appropriate, directly by IDB. For more information, see Section B.4 of this Funding Proposal.

The **paradigm shift** of the Program is achieved by having as a long-term outcome an EV conducive ecosystem which results in investors purchasing EVs on a commercial base. The Program fosters a structural shift towards low-carbon, climate-resilient, sustainable and attractive PT systems which can revert the declining PT mode share trend. Barriers towards mass EV deployment can successfully be eliminated or reduced through Program interventions. The Program proposes an adaptation approach to investments in e-mobility that consists of: (i) the deployment of climate-resilient IEUTS and (ii) institutional capacity building activities aimed at improving existing planning, design and decision-making processes for urban transport projects, aiming at defining long-term frameworks and/or local regulations and norms to sustainably manage climate-related risks associated to intense precipitation and flooding, extreme heat and more intense and frequent tropical cyclones and strong winds (see Annex 2b for additional details). Accelerated EV

[6] This includes infrastructure, ancillary equipment for electromobility, surrounding public spaces of stations and terminals, green infrastructure, among other elements.

[7] As defined in the Accredited Master Agreement (AMA) between IDB and the Fund, dated 29th of August,2017, a Subsidiary Agreement means “any agreement entered into by the Accredited Entity, in its capacity as Accredited Entity and administrator of the GCF Proceeds, on the basis of or in connection with this Agreement, unless expressly agreed otherwise in an Funded Activity Agreement (FAA), with an Executing Entity (that is not the Accredited Entity).”

investments take place due to an e-mobility conducive policy environment, innovative business models, lower performance and income risks and the entrance of new market players. The Program acts basically as a market accelerator. The main contribution of the GCF towards this paradigm shift is that it happens far earlier and at a larger scale than under a BAU scenario. The Program creates added value through knowledge management, interchange of experience, development of the skills and competences needed in the workforce and through creating a critical mass of commercial EV deployment in various countries which goes far beyond the simple aggregation of individual projects.

The expected **GCF fund-level impacts** are (i) a total investment of 450 MUSD of which the GCF 200 MUSD (leverage ratio of 1.25) of which 54% for mitigation and 46% for adaptation measures resulting in (ii) 7,547,602 $MtCO_{2e}$ of direct GHG emission reductions with a GCF cost of intervention of 26 USD/tCO_{2e} (iii) 549 $tPM_{2.5}$ and 5,211 tNO_x reduced, economic benefits due to reduced emissions valued at 400 MUSD of which 74 MUSD due to reduced local air pollution, plus nearly 1.5 million direct and 8 million indirect beneficiaries of adaptation measures representing 9% of the entire population of Program countries.

The initial **Sub-Project pipeline** of the Program for implementation within the first 2-3 years includes indicative projects from Barbados, Chile, Colombia, Costa Rica, Dominican Republic, Jamaica, Panama Paraguay and Uruguay.[8]

[8] Sub-Project identification will follow IDB programming procedures considering Program's eligibility criteria, goverment priorities, and consistency with overall Bank activities and programming in the country.

B. PROJECT/PROGRAMME INFORMATION

B.1. Climate context (max. 1000 words, approximately 2 pages)

CLIMATE CHANGE PROBLEM AND THE RELEVANCE OF ELECTRIC MOBILITY

Transport contributes almost one-quarter of the current global energy-related GHG emissions and is growing faster than any other energy end-use sector. Latin America already accounts for 10% of global GHG emissions as of today. Transport related GHG emissions in program countries represent in 2018; 12% in Barbados, 26% in Chile, 16% in Colombia, 37% in Costa Rica, 18% in the Dominican Republic, 19% in Jamaica, 27% in Panama, 19% in Paraguay and 10% in Uruguay.[9]

Regarding urban development, LAC is among the most urbanized regions in the world with over 80% of its population living in cities.[10] Its coastline extends over 700,000 km and it is where many of the largest cities are located. More than 27% of its population lives in coastal areas, with an estimated 6–8% living in areas that are at high or very high risk of being affected by coastal hazards- among them, the low-lying Caribbean states, which are especially vulnerable (WMO). Cities in LAC are projected to continue growing in the next decades and electrified urban transport infrastructure is expected to be an important element of their vitality and economic growth. For that reason, as climate change impacts continue to evolve and intensify, transport urban infrastructure in these cities need to be designed and operated so that climate-related risks are managed. According to UNDRR, risk is concentrating in the region's fastest-growing small and medium-sized urban areas (home to approx. 340 million people). An illustration of this situation is the large number of high-impact hydrometereological events that occurred during 2020 and that were associated with loss of or damage to vital infrastructures of communities and populations in urban areas. Consequently, climate-resilient infrastructure has been identified as a priority in almost every single NDC within the LAC region.

Hydrometeorological events, such as floods, storms, droughts and heatwaves, account for 93% of all disasters that took place in the region over the last 20 years (WMO, 2020). Along previous lines, climate hazards of highest concern for the LAC region to be exacerbated by climate change include, (i) intense precipitation and flooding; at the end of 2020 for example intense rainfall events brought landslides, floods and flash floods to rural and urban areas in Central and South America, (ii) temperature increase, drought and extreme heat; major heatwaves affected the region, especially in many cities of South America, with temperatures above 40°C several days in a row, (iii) sea level in the Caribbean, rising at a slightly higher rate than the global average (3.3mm/year) and (iv) more destructive hurricanes; for example category 4 hurricanes Eta and Iota affected over 8 million people in Central America in 2020.

Regarding GHG emissions, transportation emission in LAC could reach 1.4 $GtCO_{2e}$ by 2050 under a BAU scenario whilst under a 2050 decarbonization pathway heavily counting on transport electrification, the GHG emissions could be limited to 0.2 $GtCO_{2e}$ (Vergara L., 2015). Limiting the global temperature increase to below 2°C requires changing this transport emissions trajectory, which involves the development of an integrated electromobility ecosystem encompassing various transport modes, coupled with the low-carbon production of electricity (Paris Declaration on Electro-Mobility and Climate Change & Call to Action, 2015). Latin American countries have above-average transport GHG emissions and for deep carbonization to happen large-scale resetting of transportation technology to zero end-use emissions through electrification including green hydrogen usage is necessary (IDB, 2020).

Electrification is a paradigm change and a game-changer. It is a must if carbon neutrality shall be achieved. Shift and improve measures are not capable to reach carbon neutrality whilst electrification coupled with a fossil-free grid creates this opportunity. Electrification is happening within all vehicle segments. However, long-range vehicles such as inter-urban buses or long-haul trucks are only at the start of electrification. Hydrogen technology is, at least initially, a more appropriate technology solution for these vehicle segments. Battery Electric Vehicles (BEVs) are the most competitive and also have the largest environmental impact in urban areas. Hybrid and plug-in hybrid vehicle technologies have been outgrown by the fast development of battery technology and only offer a limited GHG impact and are therefore not considered in this Program (see for further details Annex 2a). The Program focuses on high-utilization commercial vehicles and excludes passenger cars and motorcycles for individual usage. Replacing commercial units has a high GHG as well as air quality and health impact and avoids a negative social impact which could result from fostering individual usage passenger cars.

[9] https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=ZJ

[10] 10 Ferreyra, Maria Marta; Roberts, Mark. 2018. Raising the Bar for Productive Cities in Latin America and the Caribbean. World Bank Latin American and Caribbean Studies; Washington, DC: World Bank

NEED TO ADAPT E-MOBILITY SOLUTIONS TO CLIMATE CHANGE ASSOCIATED RISKS

Many countries in LAC are betting on electromobility and expect it to be an important element of their climate-resilient and carbon-neutral development pathways. Although the region contributes only to 8.4% of global CO_2 emissions, it already pays a heavy price from extreme hydrometereological events. More than 152 million people in LAC have been affected by climate-related disasters between 2000 and 2019. Furthermore, 56% of losses suffered by firms in LAC after a disaster are due to transport disruptions. This is the highest share in any region (global average is around 40%) (WB, 2019). Therefore, cities in the region need to act and prepare future electrified urban transport for the challenges ahead brought by climate change, so that climate-resilient IEUTS can bring benefits to local communities which span from improved accessibility and stronger economic growth to social inclusion.

In connection to the above, electromobility assets such as V2Gs for example, may also contribute to strengthening the reliability of local electricity grids as their exposure to climate hazards increases over time. Such is the case of cities in Central America and the Caribbean which have seen an increase in the number and intensity of annual tropical cyclones in the last decade.

The IDB has led research on the vulnerability of hydropower to climate change in Latin America, specifically in Central America[11] and the Andean[12] region, being hydropower the main source of electricity in the region with almost 50% installed capacity in its power matrix. The studies conclude that impacts are geographically differentiated but significant depending on the country analyzed, with average electricity supply costs increasing by up to 7% in some cases. In the case of Central America, a generalized decrease in precipitation is expected in the basins analyzed in 7 countries, significantly affecting future hydroelectric production; while an increase in average precipitation and seasonality is expected in large areas of the Andean region, with significant geographic differentiation. Considering these possible future impacts, it is foreseen that power grids in countries with high shares of hydropower will become less flexible to accommodate and integrate new variable sources of energy, such as solar and wind. These two technologies have become the preferred choice when it comes to capacity expansion for electricity generation in Latin America due to their price competitiveness. In this context, additional flexibility services and measures will be required by power network operators to maintain system reliability and adequacy. Energy storage possibilities and auxiliary services provided by stand alone or mobile batteries, for example through V2G technologies, or seasonal storage through hydrogen, have the potential to help alleviate some of this climate change induced impacts in the power grid and contribute to increase its resiliency. In this regard, additional vulnerability assessments may also be carried out, as deemed necessary under IDB's Disaster and Climate Risk Assessment Methodology (DCRA).

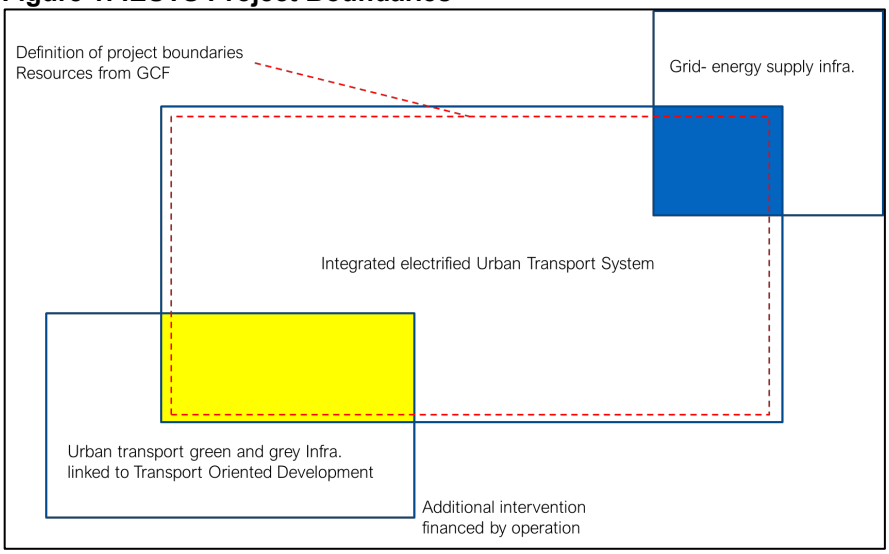
In order to address the challenges that electromobility investments face in the region in light of climate change, the proposed program presents an adaptation approach that covers two aspects. The first will look into climate change-associated risks of the program's financed infrastructure (included in Components 1 to 3). For this purpose, IDB's DCRA[13] will be used as the framework to guide the identification, design and implementation of adaptation hard measures. The second aspect is related to building/strengthening the adaptive capacity of stakeholders to better manage the program's financed infrastructure and associated ancillary equipment in light of new operational challenges created by climate threats (this includes also creating awareness of climate hazards and risk-reduction processes) (included in Component 4). Planned activities include among others, developing a KMS, training to enhance the system's operation, maintenance and the improvement of planning and design methodologies and processes to duly incorporate uncertainty in the decision making. This second aspect of the approach shall also contribute to gather, synthetize, and apply new knowledge on climate risk management in the design of sectorial regulations/norms for the service reliability of e-mobility solutions at a national and/or regional scales. This approach is transversal to the E-Mobility Program and is aimed at building climate resilience of the IEUTS which encompasses e-mobility infrastructure, urban infrastructure (green and grey), and grid infrastructure (see Figure 1).

[11] https://publications.iadb.org/en/publication/17190/vulnerability-climate-change-hydroelectric-production-systems-central-america-and

[12] https://publications.iadb.org/es/vulnerabilidad-al-cambio-climatico-y-medidas-de-adaptacion-de-los-sistemas-hidroelectricos-en-los

[13] https://publications.iadb.org/en/disaster-and-climate-change-risk-assessment-methodology-idb-projects-technical-reference-document

Figure 1: IEUTS Project Boundaries



Dashed boxes indicate elements that are part of the integrated system and that will be included in the DCRA methodology.

Under this systemic approach, specific e-mobility infrastructure's climate resilience shall not only be improved but also be combined with measures to reduce the vulnerability of urban areas and grid infrastructure to climate change that lay within the defined boundaries of the IEUTS. This means the Program will directly contribute to increase climate resilience of the IEUTS as a whole, in order to ensure that e-vehicles offer expected quality service under observed and expected extreme weather conditions such as high temperatures or high-intensity precipitation that exacerbate flooding hazards (including also elements of e-mobility infrastructure such as charging infrastructure and bus depots). Along these lines, investments in urban areas to increase climate resilience of the IEUTS include for example grey infrastructure to mitigate flood hazards, support of public, non-motorized and electric micro-mobility and the customized design of Nature-Based Solutions (NBS). In regard to the third element (e.g., grid electricity infrastructure) project activities may include investments to facilitate linking of 100% renewable energy generation with e-mobility. This is key especially for SIDS and includes projects with V2G potential. This technology can help sustain electricity supply to critical building infrastructure from EVs in case of extreme climate events such as hurricanes and thereby improving the resilience and independence of the grid at critical spots. In the long-term V2G can also give utilities access to electricity stored in vehicles to improve load balancing and to mitigate supply bottlenecks: this feature is especially important for grids moving towards high rates of (supply unpredictable) renewables. The 2nd life application of used EV batteries as storage units can also reduce costs of stand-alone or backup renewable energy units or they can increase grid resilience through acting as grid shavers, especially in urban settings, thus reducing peak impacts (applied e.g. to high-powered chargers to reduce maximum power demand and peak loads).

CONTEXT

Latin America has strong enabling conditions in terms of clean transport and e-mobility. The region has one of the cleanest electricity generation portfolios in the world (high hydroelectric production and growing deployment of wind and solar power plants). Therefore, the adoption of an e-mobility strategy would allow the sector to move towards a decarbonization pathway. The table below shows the carbon intensity of electricity generated by Program countries. With these grid factors, EVs can reduce GHG emissions on a well-to-wheel base by 70-80% compared to fossil units.[14]

Table 1: Carbon Grid Factor of Program Countries ($kgCO_{2e}$/kWh)

Country	Carbon Grid Factor Electricity
Barbados	0.484
Chile	0.235
Colombia	0.208
Costa Rica	0.039
Dominican Republic	0.426
Jamaica	0.498

[14] See Annex 22

Panama	0.230
Paraguay	0.000
Uruguay	0.065
Average	0.243

Source: IFI, Version 3.1, 2/2022

Program countries that currently have above-average carbon grid factors have all adopted ambitious renewable energy (RE) targets for the near future with the goal of reducing dramatically GHG emissions from electricity production and therefore also from EV deployment. The IDB is supporting these countries in their efforts to increase RE targets.

- Barbados is committed to reduce 22% of electricity consumption compared to BAU by 2029, and to have 20% and 29% of RE supply by 2026, and 2029 respectively. The Barbados National Energy Policy launched in 2017 includes suggested targets for solar, wind, and biomass energy sources, as well as biofuels for the transportation sector and natural gas as a bridging fuel to reduce the use of heavy fuels. In the past five years a growing number of solar PV systems have been and continue to be interconnected to the grid. Investment in renewable energy and energy efficiency through the IDB led Energy Smart Fund has allowed annual savings of 4,403 MWh and installed 1.9 MW of solar PV generation, distributed among various sectors. To date, another IDB loan operation, the Public Sector Smart Energy Program (BA-L1025) has installed approximately 4.3 MW of solar PV generation, distributed among 15 government buildings. The IDB group (including the private sector arm IDB invest) is also supporting the market reform, administrative processes for licensing, and competitive procurement of new renewable energy capacity and its associated regulation.
- Chile has a target of 80% RE generation by 2030[15] compared to 45% in 2019[16].
- The Dominican Republic has a target of 25% of RE by 2025[17] compared to 10% in 2019[18] and 30% by 2030 as part of the RELAC initiative[19].
- Jamaica has a RE target of 33% in 2030 and 50% by 2037[20] compared to 11% in 2019[21]. Jamaica is making rapid progress in diversifying its energy matrix away from an overwhelming dependence on oil for electricity generation towards LNG and increasing the penetration of variable renewable sources, namely wind and solar PV. On the energy efficiency side Jamaica has one of the highest energy intensity rates in the LAC region, as well as one of the highest electricity tariffs, which together represent an important opportunity for intervention with a compelling return on investment. The $40m Energy Management and Efficiency Program (EMEP) underway, financed and led by the IDB, is a demonstrative step in this direction for the public sector, aimed at reducing electricity consumption in 80 government buildings by 30%. In terms of energy planning the most recent draft Integrated Resource Plan (IRP) document indicates an increasing RE penetration to 35% of generation by 2035 and to 41% by 2037 from 17% by 2019.

Latin America is also well known for innovative e-bus business models in Colombia and Chile (see Inbox).

Inbox: Innovative Business Models for e-Bus Promotion

Chile

The case of Chile is especially interesting due to the introduction of new business models separating bus ownership and bus operations. The first batch of 200 electric buses was based on investments of electric utilities leasing e-buses to operators, in order to boost their core business (energy sales and the installation of charging infrastructure). Critical for the first batch of e-buses was not only the investment of electric utilities but also a government subsidy for the entire incremental investment cost of e-buses versus fossil units as well as changes in concession contracts reducing risks for investors in vehicle assets and ensuring payments from vehicle operators. In subsequent tenders ownership of e-buses is mixed with some offers based on JVs (Joint Ventures) of bus operators with bus suppliers and others being JVs of bus operators with investment firms. Electric utilities are currently no longer engaged in new investments or have teamed up with capital investment firms as they do not consider vehicle investments to be a part of their core business (e.g. AMP Capital and NEoT Capital have entered as investors). The government no

[15] Innovative Decarbonization Policies: Chile | Column | Renewable Energy Institute (renewable-ei.org)
[16] Data tables – Data & Statistics - IEA
[17] Energy - Climate Targets - Dominican Republic - Climate Change Laws of the World (climate-laws.org)
[18] Data tables – Data & Statistics - IEA
[19] https://hubenergia.org/relac
[20] Leveraging Energy From Renewable Sources Key To Creating New Jamaica – Minister Vaz – Jamaica Information Service (jis.gov.jm)
[21] Data tables – Data & Statistics - IEA

longer pays for incremental investment costs but still offers other advantages for e-buses such as longer concession periods and additional points in the bidding process representing effectively a subsidy to e-buses. Critical take-aways from the Chilean case are: (i) separation of ownership and operations can be an effective instrument to promote e-buses and can bring in new financially strong players into the industry; (ii) for kick-starting the process investment subsidies are critical; (iii) e-buses still require incentives to be competitive with fossil buses; (iv) required subsidies can be reduced significantly after an initial fleet of e-buses and after having established a working business model.

Colombia

Large Colombian cities already run successfully since many years BRT systems with large private companies working as operators and a public system manager paying companies based on distance driven cum service delivery targets. E-buses have been introduced for secondary routes based on local e-bus targets. The initial batch of 500 e-buses in Bogota (2019) was based on a tender which only allowed for the provision of e-buses. A subsequent second tender which allowed for any technology resulted in all winning offers to be fossil buses, thereby clearly showing that e-buses are not yet commercially competitive (end 2019). The third tender (2020) included significant additional points for e-buses as well as longer concession periods. This made electric buses competitive with fossil units but also resulted in 16% higher per-km costs of buses which is being paid by the municipality. The experience of Bogota reveals two important points: (i) e-buses can be inserted into public transport operations and will be offered by private operators if concession contracts are sufficiently attractive and if e-buses receive benefits compared to fossil units; (ii) without financial incentives e-buses are commercially not yet competitive. However, some large cities such as Bogota are willing to pay for these incremental costs due to e-buses improving air quality and reducing GHG emissions.

The e-Mobility Program will work frequently in smaller and medium sized cities where such business models might be less applicable due to lower levels of planning, and regulation as well as much smaller volumes and sizes of transport companies making e.g. the involvement of 3rd party asset owners less probable. For such cities the Program will therefore develop business models apt to their size, structure and conditions.

The COVID'19 pandemic has created an unprecedented challenge for many Latin American countries, from the health and economic perspectives, but it is also opening new opportunities for an accelerated sustainable transformation of its energy, transport, and urban landscapes while contributing to economic recovery. A report prepared by the ILO shows that fostering of electric mobility can have a significant positive job impact primarily due to the induced impact of savings of consumers on fossil fuels and vehicle maintenance resulting in increased spending on goods with a high income elasticity which tend to be labor intensive service-goods (ILO, 2020). Equally a recent study by the IDB and the International Labor Organization identifies that a Net-Zero Emissions Future can create 15 million net jobs in the LAC region by 2030 (IDB, 2020). Thus, accelerating transformation in energy and transport, among other sectors, make decarbonization possible and can create jobs, unlock economic and social benefits, and help protect the region's unique natural resource treasures. Some countries in LAC are already responding to these challenges and opportunities by adjusting their growth and stimulus strategies to accelerate green transformation. While the transition to electro mobility offers great potential for the creation of new jobs, it will also negatively affect some high-emitting sectors and alter most existing occupations in terms of task compositions and skills requirements. In order to ensure a Just Transition for all, skills development measures will be instrumental in reaping the benefits of potential job creation in new green activities and in addressing the social challenges in shifting to more sustainable models.

A brief context per country is given below.[22]

Barbados

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
430 km^2	0.3 million	15,200 USD	0.11 million	1.57 USD/l	0.24 USD/kWh

Barbados is among the countries most vulnerable to climate change (Stennett-Brown RK, 2019). The 2021 Physical Development Plan (PDP) is based on a vision of sustainable growth and development of Barbados. It addresses the critical impacts of climate change on Barbados through policies and strategies that enable the people to thrive and remain resilient under changing climate conditions. The Roofs-to-Roofs Program (R2RP), supported by the GCF, operationalizes the PDP and includes roof-top solar PV installation increasing distributed electricity generation which

[22] Sources: World Bank database for population and current USD GDP/capita (2020); Local data for vehicle fleet; Diesel and electricity price (average households and businesses) based on www.globalpetrolprices.com for August 2021

shortens recovery time post-disaster and increases resilience. Barbados has put as goal in its updated NDC to be a 100% fossil-free island by 2030. This implies not only 100% renewable electricity generation but also 100% EV or alternatively-fueled vehicles rates. This is hardly a realistic target as it would require replacement and scrapping of the entire fossil vehicle stock by 2030. Effective April 2021, the government's procurement policy is to prioritize the purchase of electric or hybrid vehicles and the Barbados Transport Board's intention is to operate a fully-electrified government bus fleet by 2030.

Chile

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
756,950 km^2	19 million	13,200 USD	5.6 million	0.89 USD/l	0.16 USD/kWh

At the end of 2017 Chile published its National Electromobility Strategy, a document realized jointly by the Ministry of Energy, the Ministry of Transport and Telecommunications and the Ministry of the Environment (MinEN, MTT, MMA, 2017). The National Strategy for Electromobility is currently being updated. Chile has also a National Green Hydrogen Strategy (MinEN, 2020). The updated NDC Chile has as target that the country will be carbon neutral by 2050, and includes the following measures for electric mobility: (i) 100% of e-taxis by 2050; (ii) 100% of electric public transport buses by 2040; (iii) 60% of light vehicles in stock, private and commercial, shall be electric by 2050. Chile has numerous policies and incentives to promote different categories of electric vehicles including buses and taxis and has as of end 2021 more than 800 e-buses operating primarily in Santiago de Chile.

Colombia

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
1,141,750 km^2	51 million	5,300 USD	8.5 million	0.58 USD/l	0.13 USD/kWh

Colombia has an automotive industry dedicated mainly to vehicle assembly, auto parts production and motorcycle assembly. The NDC contemplates for the transportation sector amongst others to achieve 600,000 registered electric taxis, buses, light commercial vehicles including small trucks and official vehicles. The Government has developed the National Strategy for Electric Mobility, which aims to promote the electrification of the transportation sector. Bogota has purchased as of end 2020 nearly 1,500 electric buses, whilst Cali and Medellin have pilot fleets of e-buses. The Congress also issued the Electromobility Law (No.1964 of 2019) which establishes goals and incentives and requires that all public buses purchased from 2035 onwards be electric.

Costa Rica

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
51,100 km^2	5 million	12,100 USD	1.5 million	0.96 USD/l	0.09 USD/kWh

Costa Rica reaffirmed its aspiration of becoming a Carbon Neutral economy and aims for a decarbonized economy with net-zero emissions in 2050. The updated NDC of Costa Rica has concrete 2030 e-mobility targets for public transport, passenger cars and fleets (8% of the vehicle stock). For other vehicle categories such as motorcycles targets and measures shall also be developed to migrate towards EVs. Costa Rica has published a national plan for electric transport which includes concrete steps towards electrification of vehicles and has approved 2018 the law on incentives and promotion of electric transportation which includes targets for EV penetration, the establishment of a public charging infrastructure as well as important tax incentives for private EVs.

Dominican Republic

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
48,400 km^2	11 million	7,300 USD	4 million	0.88 USD/l	0.16 USD/kWh

The updated NDC of the Dominican Republic proposes as mitigation actions the electrification of buses, taxis, school buses, minibuses and "conchos" and the creation of policies to encourage the transition to electric and hybrid mobility for private usage. The country has realized a National Strategic Plan for Electric Mobility with specific EV targets for 2030 (30% of official vehicles and public buses, 10% of private vehicles) and for 2050 (100% EVs for official vehicles and public buses and 70% of all private vehicles shall be electric).

Jamaica

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
10,990 km^2	2.9 million	4,700 USD	0.5 million	1.10 USD/l	0.27 USD/kWh

Jamaica's geographical location and biophysical landscape make it vulnerable to climate change impacts, especially for coastal sectors. Jamaica plans to increase its share of renewables in electricity generation creating a greener grid. Jamaica is lagging behind in the uptake of EVs when compared to other countries in the Caribbean. The adoption of EVs in the transport sector however aligns with the National Energy Policy goals for secure energy supply, efficient use of energy, and minimizing the environmental impacts of energy production and utilization. Jamaica Public Service is deploying charging infrastructure and the Jamaican Office for Utility Regulation is discussing an EV charging tariff for public charging infrastructure[23] (JPS, 2021) whilst the Ministry of Science, Energy and Technology proposes a target of EV take-up of 10% of the transport mix by 2030 (around 50,000 vehicles).

Panama

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
75,480 km^2	4.3 million	12,300 USD	1.4 million	0.77 USD/l	0.17 USD/kWh

Panama's national government aims to reduce GHG emissions from the transport sector, hence different departments promote sustainable mobility and alternative means of transport. The National Strategy for Electric Mobility was approved in 2019, promoting four objectives until 2030: 10-20% of the total fleet of private vehicles shall be electric; 25-40% of private vehicle sales shall be electric vehicle sales; 15-35% of the buses in the authorized concession fleets shall be electric; 25-50% of the public fleets shall be made up of electric vehicles. Panama's updated NDC focuses mainly on mitigating emissions from the land use change sector and the energy sector, of which transportation accounts for about half of the sector's emissions and represents the biggest challenge.

Paraguay

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
397,300 km^2	7.1 million	4,900 USD	2.5 million	0.83 USD/l	0.06 USD/kWh

Paraguay's NDC aims to reduce 20% of the fossil fuel consumption by 2030, compared to the projected baseline. Paraguay has three hydroelectric plants that generate a large surplus of renewable energy, thus EVs provide the opportunity to reduce various environmental and financial externalities resulting from mobility dependent on fossil fuels. In this context, the country is taking its first steps in the transition towards electric mobility, advancing with the development of technical standards for EVs, and implementing "green routes" with chargers installed between the three main cities – Asunción, Ciudad del Este, and Encarnación. The National Development Plan 2030 and the National Energy Policy 2040 consider e-mobility as one of the dimensions to achieve the country's development goals.

Uruguay

Area	Population	GDP/Capita	Vehicle Fleet	Diesel price	Electricity price
176,220 km^2	3.5 million	17,700 USD	1.2 million	1.13 USD/l	0.21 USD/kWh

Uruguay is a country recognized for its recent transition to renewable energy in the power system, with 95% renewable sources in the power mix. Uruguay has adopted several national strategies that promote energy efficiency, increased renewable energy supply, and the reduction of fossil fuel consumption. The National Sustainable Mobility Plan promotes a transition towards transport technologies with better energy efficiency. The NDC of Uruguay sets specific goals for electric mobility categories towards 2025: e-Buses (15 units unconditional and 110 conditional), e-taxis (150 units unconditional and 550 conditional) and electric light commercial vehicles (LCVs) (150 units unconditional and 900 conditional), a network of electric vehicle charging stations throughout the main roads across Uruguay (52% completed in 2020), and a fast-charging network. However, these goals are part of a scenario conditional on access to international financing.

[23] Time of use residential tariff plus 5%

CURRENT STATUS

Between 2000 and 2018 the total GHG emissions excluding Land-Use Change and Forestry (LUCF) of the participating countries grew on average annually 1.5% whilst transport emissions in the same period grew annually by 2.5%. Transport emissions as share of total emissions increased from 17% in the year 2000 to 21% in the year 2018[24].

Current transport demand per capita in developing and emerging economies is far lower than in Organisation for Economic Co-operation and Development (OECD) countries but is expected to increase at a much faster rate in the next decades due to rising incomes and development of infrastructure[25]. Limiting the global temperature increase to below 2 degrees Celsius requires changing this transport emissions trajectory, which involves the development of an integrated electromobility ecosystem encompassing various transport modes, coupled with the low-carbon production of electricity and hydrogen (Paris Declaration on Electro-Mobility and Climate Change & Call to Action, 2015). The Paris Declaration on Electro-Mobility calls for the deployment of EVs compatible with a 20% share of all road transport vehicles in 2030. To achieve this goal modelling of the IEA indicates that EVs need to represent 35% of global sales in 2030[26].

Electric mobility is still in its infant stage: End 2020 nearly 7 million Battery Electric Vehicles (BEVs) were circulating worldwide (IEA, 2021)[27]. This represents less than 1% of the total vehicle stock. 5 countries (PR China, USA, Germany, France and UK in decreasing order) represent 78% of the worlds sales of BEVs in 2020 and 82% of the world's stock of BEVs[28]. The BEV sales share is worldwide around 3% as of 2020. The only country in Latin America with more than 1,000 BEVs sold in 2020 was Mexico with around 1,900 units. With exception of Mexico which has a sales share of 0.2% of BEVs all other countries in Latin America have BEV sales share below 0.0%. EVs as percentage of total car stock rises much slower due to vehicle replacement rates. In Norway as leading country worldwide the EV car stock was in June 2021 14% although EV car sales are since more than a year > 50% of all new car sales[29]. This shows clearly that achieving significant environmental impacts, which are dependent on the car stock and not new registration numbers, will take time. It also shows the importance of acting early to achieve a high penetration rate of new registered vehicles to enable an impact in the medium term.

Fuel cell vehicles with hydrogen (H2) are still at a demonstration stage. If H2 production is based on water electrolysis using renewable energy sources, it can however offer a way to decarbonize the transportation sector, especially long-haul and heavy transport. First examples of developing entire H2 value chains are currently being realized in countries such as Switzerland[30]. The IDB has witnessed an increased demand for H2 pilots associated to transport applications. IDB's public and private windows are currently supporting various countries with national hydrogen strategies and roadmaps, piloting implementation, training and capacity strengthening, whilst supporting the creation of local inclusive "hydrogen ecosystems".

Private cars are becoming the dominant mode of transport: The mode share of PT is steadily declining in Program countries and is being replaced by private means of transport including also the strongly growing share of ride-hailing services. This results in increasing emissions of the transport sector as well as increasing economic costs of transportation due to increasing congestion and health costs.

Latin American cities are suffocated by bad air: LAC is the most urbanized region on the planet with an urban population share of 81% in 2019 (World Bank, 2020). According to the latest urban air quality database, 98% of cities in low- and middle-income countries with more than 100,000 inhabitants do not meet World Health Organization (WHO) air quality guidelines[31]. The WHO estimates that annually 4.2 million deaths result due to excessive exposure to fine particulate matter equivalent to 7.6% of all deaths[32]. The transport sector is thereby a major source of air pollution. The most vulnerable population is disproportionately affected by air pollution, as they tend to live and work closer to its sources (Mitchell G., 2003). Children and the elderly are particularly vulnerable. Recent studies show that women are more

[24] Based on data of | Greenhouse Gas (GHG) Emissions | Climate Watch (climatewatchdata.org)
[25] https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter8.pdf
[26] This includes battery electric vehicles (BEVs), fuel cell and plug-in hybrid electric vehicles (PHEVs); paris-electro-mobility-declaration.pdf (windows.net)
[27] This includes next to full EVs also plug-in hybrid electric vehicles
[28] Data compiled by Grutter Consulting based on Global EV Data Explorer – Analysis - IEA
[29] Elbilbestand | Norsk elbilforening
[30] See https://h2energy.ch/
[31] https://www.who.int/airpollution/data/cities-2016/en/
[32] https://www.who.int/gho/phe/en/

affected by poor air quality than men (Clougherty, 2010) due to biological differences, socioeconomic disparities and unequal gender norms. (Mehra, 2021).

Gender and transportation: women and men have differentiated needs in terms of transportations given the social norms and gendered distribution of care and household responsibilities, which affect mobility patterns and access to transport.[33]

BASELINE TRENDS

- By 2030 transport emissions will increase in absolute terms and will represent a much higher share of total GHG emissions in participating countries.
- Fossil vehicles will continue to dominate the landscape as EVs remain, even with decreasing prices, financially and from the convenience point of view not yet sufficiently attractive to be commercially viable.
- PT mode share will continue to decrease with private vehicles being the dominant mode of transport.
- Air pollution will remain at high levels: new vehicle emission standards for fossil vehicles will allow for a decrease of emissions per vehicle-kilometer, which will however be (partially) offset through increased vehicle numbers and a mode shift towards private and more polluting vehicles.

RELATED PROJECTS AND INTERVENTIONS

Multiple actors are engaged in promotion of e-mobility. Next to IDB, the AFD group, CABEI, CAF, the GEF, GIZ, KfW, NAMA Facility, the World Bank and UN Environment Programme are all active in this area.

UN Environment Programme is implementing the GCF Readiness Program “Advancing a regional approach to e-mobility in Latin America” in fourteen countries in the region including also Program countries (Argentina, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay and Uruguay are part of the UN program). The project aims at building capacity, development of e-mobility policies and business models, identification of strategies to finance the shift to electric mobility in the region and will be implemented combining a national with a regional approach.

The Global Environment Facility (GEF) is implementing through UNEP a Global E-Mobility Program including as Program countries Chile, Costa Rica and Jamaica. Technical Assistance (TA) of this program relates to awareness raising campaigns, capacity building and the development of instructional structures to support the introduction of electric mobility. It furthermore includes laying the ground for large-scale market introduction of electric mobility through (i) the development of policies, including fiscal, regulatory and local measures; (ii) the establishment of adequate business models and finance mechanisms; and (iii) the development of plans and studies to ensure environmental and social sustainability, including promoting gender equality. The investment component of the Country Child Projects will be used for electric mobility demonstration projects to allow for the creation of local experience to de-risk the technology and to attract investors to upscale electric mobility in the respective countries.

AFD together with CAF, GIZ and KfW have put forward an e-mobility Program to the GCF which includes Colombia, Costa Rica, Dominican Republic, Panama and Paraguay. AFD includes only mitigation and focuses on commercial electric vehicles, primarily e-buses. The IDB proposal is complementary (i) by having a comprehensive approach for urban mobility including sustainable urban development with a gender perspective and micro-mobility as well as activities to increase urban resilience, (ii) by including advanced technological trends such as green hydrogen usage in transportation, and (iii) by including also electric vessels for commercial usage. A Memorandum Of Understanding (MOU) between IDB and AFD has been signed to strengthen the collaboration and synergies on Electromobility.

Coordination with other domestic or international activities in e-mobility is made on a national level. On-going initiatives are focused on technical assistance and pilot projects. This Program shall complement these efforts by strengthening financial assistance whilst improving the e-mobility ecosystem through targeted TA. The IDB Program will act in a complementary manner to other assistance already offered with a focus on countries where TA of other organizations is not available or limited and by including the aspects not covered by other projects or programs such as green hydrogen usage for transportation or integration of e-mobility with improved urban resilience. Additionally, the

[33] World Bank. 2020. Why does she move? A study of women’s mobility in Latin American cities.

implementation experience of large-scale projects will help to strengthen existing TA activities which currently lack practical experience outside pilot projects thereby being often too abstract and theoretical.

B.2 (a). Theory of change narrative and diagram (max. 1500 words, approximately 3 pages plus diagram)

IF IEUTS pilot green hydrogen and V2G projects are implemented **THEN** the population will have access to climate resilient, affordable, attractive and convenient urban mobility systems and investors will be interested in pouring resources into EVs projects which helps the involved countries to meet their GHG reduction targets **BECAUSE** transportation systems will be less vulnerable to climate risks, will better address the differentiated needs of women and men in transportation and will have a more comprehensive mobility offer using low carbon electric vehicles combined with NMT and electric micro-mobility.

The potential **paradigm shift** of the Program in terms of **scale** is a shift from the current reliance on fossil-fuel powered transportation with high vulnerability of urban transport infrastructure against impacts of climate change towards electrified climate resilient transportation means. Higher quality public transport and urban infrastructure catering to the needs of people cycling, walking and using electric micro-mobility combined with gender-sensitive design of urban transport systems allow for behavioral change reversing the current trend towards private means of transportation and increasing use of public and NMT, especially women's satisfaction and safety in public transportation. The Programs technical and financial assistance in the design and implementation of business models in line with the specific needs of electric mobility and in fostering comprehensive urban mobility interventions centered around public and NMT are decisive factors to foster this paradigm shift. The development and implementation of business models which tackle the barrier of high upfront investments pulls in other investors and allows for massification at scale in a commercial manner. Innovative business models include such which separate asset ownership and asset operations, bulk purchase or pay-as-you-go schemes. The Program's assistance in developing tools and methods for increasing grid and transport infrastructure resilience in a cost-effective manner has the potential for a shift towards more resilient urban transport infrastructure and towards mass usage of hydrogen and batteries of EVs as storage facilities to enable improved grid stability whilst increasing the share of renewables. In terms of **replicability** the Program's investments in IEUTS combined with the market trend of strongly decreasing prices of EVs allow for solutions to be replicated across other cities in Program countries. This is enabled through knowledge management and outreach instruments and the implementation of at-scale IEUTS as well as initial pilot projects in the fields of hydrogen usage for transportation and V2G which reduce decisively the risk levels for follow-up investors. The paradigm shift is **sustainable** due to the promotion of government policies favoring investments in EVs and resilient infrastructure combined with a market where EVs will achieve price-parity with fossil units within this decade. Business models which favor the deployment of EVs are fostered in the different countries which allow for scaling up measures and for making them financially more sustainable. The interventions make cities more livable resulting also in a behavioral change towards public and non-motorized mobility in people and not car-oriented cities. The Program's technical assistance focus on the design and promotion of policies which enable a commercial mass-uptake of e-mobility, development of human capital in the transition to e-mobility and the interaction with the private sector in the implementation of projects are critical for achieving this target. The main contribution of the GCF is that this paradigm shift towards climate-resilient electric mobility happens faster and at a much larger scale than under a BAU scenario.

The expected **outcomes** of the Program are (1) an urban transport system which is less vulnerable to extreme climate events[34], including floods, heatwaves and landslides, by implementing climate-proof urban transport infrastructure which is expected to reduce the vulnerability of cities and their transport system to climate hazards; (2) an electric grid which could be made more resilient to climate events through the possibility of using hydrogen and EV batteries as energy storage providing electricity during climate hazards; (3) reduced GHG emissions from the commercial vehicles (public transport, taxis, institutional fleets, freight transport) due to mode shift towards public and NMT and a shift from fossil to electric means of transportation resulting in 7.55 $MtCO_{2e}$ decreased GHG emissions and energy savings of 128,000 TJ due to EVs being on average factor 3 times more energy efficient than fossil units resulting in economic benefits reflected in reduced fuel imports, and less foreign dependency and environmental benefits of reduced resource usage; and (4) improved public and private sector capacity, including for the development of human capital, and a more favorable enabling policy framework for low carbon and climate resilient transport in the domain of electric mobility.

[34] The main hazards that will be considered are intense precipitation and flooding, extreme heat, sea level rise, hurricanes and strong winds. Please see Annex 2b for more information: Table 3 for *City typologies to guide the climate risk assessment.*

Expected **co-benefit outcomes** are (i) an improved air quality resulting in environmental co-benefits of 549 tons less $PM_{2.5}$ and 5,221 tons lower NO_x emissions which again result in economic health cost savings estimated at 74 MUSD; (ii) increased use of public and NMT resulting in lower costs for mobility as economic benefit and gender co-benefits due to implementing measures which favor a safe, available and affordable usage of public and NMT by women by incorporating a gender perspective in the system's design.

Outputs of the Program are (1.1) Fewer urban infrastructure damaged resulting from climatic shocks because of higher investments in vulnerability reduction; (1.2) Fewer days to restore the IEUTS public transport service after climate shocks due to investment in climate resilience; (2.1) H2 and V2G pilot projects are used to assess the potential of such projects to increase the grid stability through usage of H2 and batteries of EVs as storage medium for electricity production during critical weather events and/or as peak shavers realized in 4 projects; (3.1) E-mobility interventions are integrated with measures to strengthen attractiveness and convenience of public and NMT including measures such as exclusive bus and cycle lanes, improved pedestrianization and public transport accessibility, transit-oriented development, fostering of electric micro-mobility and gender sensitive interventions realized in 7 cities; (3.2) EV fleets are deployed with innovative business models and supported by regulatory policies to enable mass application of EV fleets; (4.1) A climate resilient e-mobility ecosystem integrated with urban transport is established to enable mass uptake of e-mobility; and (4.2) Strengthened institutional and regulatory systems for climate-responsive planning and development.

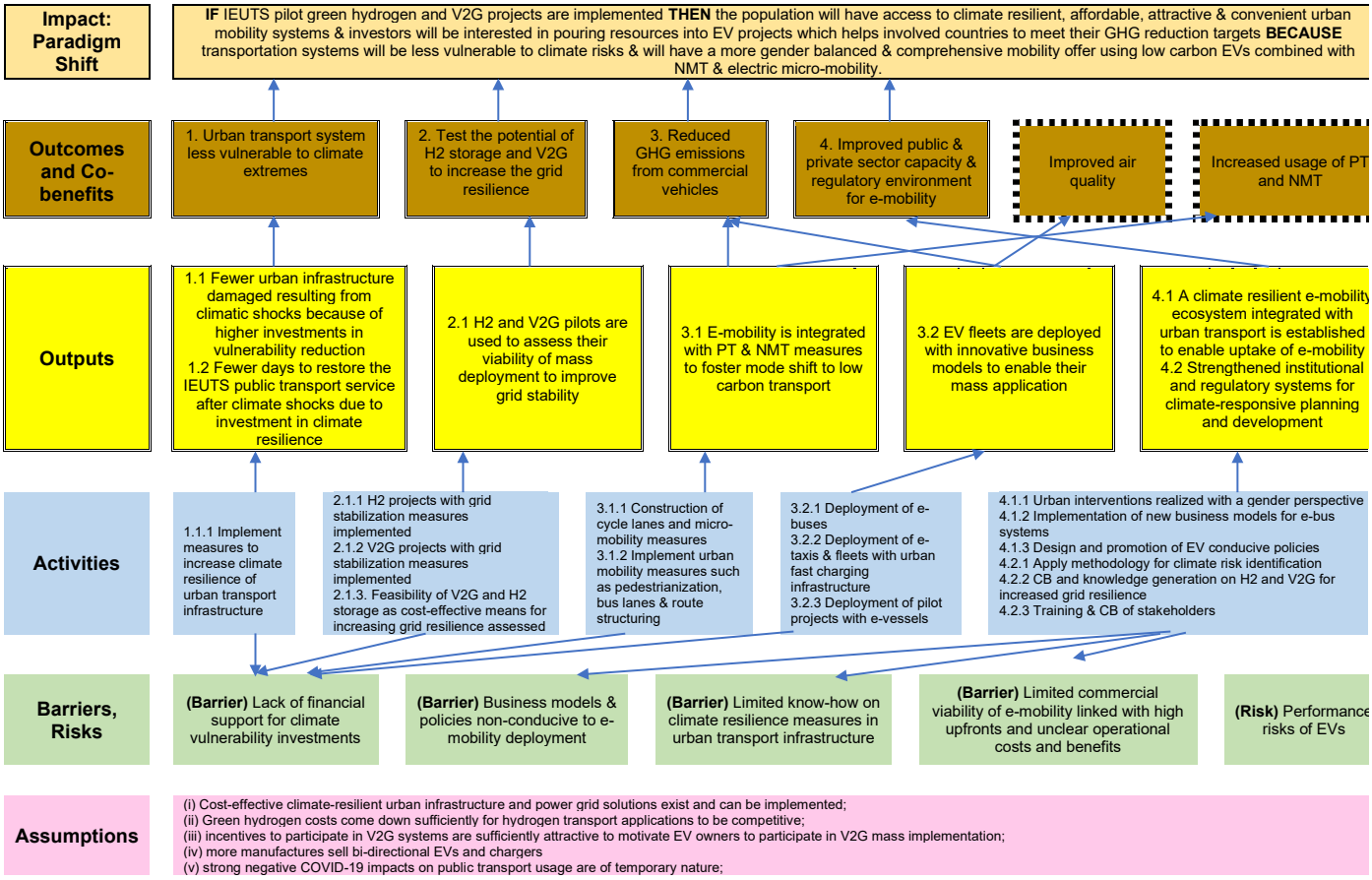
Activities related to the integration of urban infrastructure with climate resilient measures are (1.1.1) identification and implementation of measures to increase the climate resilience of urban transport infrastructure. Activities related to the assessing the feasibility and commercial attractiveness of using H2 and V2G projects to increase the grid resilience (2.1.1) at least 2 H2 projects can produce electricity for insertion into the grid during critical periods; (2.1.2.) At least 1 V2G projects implemented which can deliver electricity for critical periods (2.1.3.) The technical and commercial feasibility of H2 storage and V2G for increasing grid resilience is tested and assessed. Activities related to the integration of e-mobility with PT and NMT are (3.1.1) Construction of around 60km of exclusive cycle lanes and micro mobility measures; (3.1.2.) Implementation of urban mobility measures such as improved pedestrianization, bus lanes, route restructuring and accessibility measures implemented in minimum 50% of all city projects

Activities related to the deployment of EV fleets linked with innovative business models and supportive policies are (3.2.2.) deployment of around 470 electric buses; (3.2.2) deployment of 250 e-taxis linked with an urban fast-charging infrastructure; (3.2.3.) Deployment of 2 pilot projects with electric vessels. Activities related to the establishment of a climate resilient e-mobility ecosystem integrated into urban transport include (4.1.1) Urban interventions realized with a gender perspective; (4.1.2) Implementation of new business models for e-bus systems for investments under output 3; (4.1.3) Design and promotion of EV conducive policies. Activities related to the strengthening of institutional and regulatory systems for climate-responsive planning and development include (4.2.1) Apply methodology for climate risk identification for investments under Output 1; (4.2.2) Capacity Building (CB) and knowledge generation on H2 and V2G for increased grid resilience for investments under output 2; and (4.2.3) Training & CB of stakeholders

The **barriers** identified and which shall be overcome with this Program are (i) limited commercial viability of EV investments related to high upfront costs, low or negative profitability, long payback times and possible loss of income if assets cannot perform at the equal level as fossil units e.g., due to range limitations. The commercial viability barrier is especially true for electric vessels and hydrogen applications in the transport sector which are still at the initial phase of the learning curve; (ii) Business models and policies which are not conducive to a mass EV deployment including e.g. atomized public transport operators with limited capital access, contracts for public transport services which have a too short duration to be viable for EVs, policies favoring investments in roads and private means of transport or transport policies not taking into account gender aspects. This barrier is linked to limited experience with and knowledge on innovative business models, E-mobility system designs and on effective policy instruments (iii) limited know-how on climate risk assessments that quantify the severity and frequency of potential extreme climate-related events and their impacts on the IEUTS, and limited experience with cost-effective measures to increase the resilience of urban transport infrastructure; and (iv) lack of financial support for investments to reduce climate vulnerability of urban transport infrastructure. The identified major **risk** is technological, operational and performance risks of EVs linked also with a limited availability of skilled maintenance staff. Project monitoring, training and CB as well as outreach activities allow to manage this risk by providing stakehodlers with updated performance data and actual experience of fleet managers.

Core **assumptions** are (i) Climate change will increase the severity and frequency of intense precipitation and flooding, extreme heat, sea level rise, hurricanes and strong winds events, which present a greater risk to the urban infrastructure

and the operation of the IEUTS. Cost-effective climate-resilient urban infrastructure and power grid solutions can reduce such risks; (ii) Green hydrogen costs come down sufficiently for hydrogen transport applications to be competitive; (iii) incentives to participate in V2G systems are sufficiently attractive to motivate EV owners to participate in V2G mass implementation; (iv) more manufactures sell bi-directional EVs and chargers (v) strong negative COVID-19 impacts on public transport usage are of temporary nature.



B.2 (b). Outcome mapping to GCF results areas and co-benefit categorization

Outcome number	GCF Mitigation Results Area (MRA 1-4)				GCF Adaptation Results Area (ARA 1-4)			
	MRA 1 Energy generation and access	**MRA 2** Low-emission transport	**MRA 3** Building, citiies, industries, appliances	**MRA 4** Forestry and land use	**ARA 1** Most vulnerable people and communities	**ARA 2** Health, well-being, food and water security	**ARA 3** Infrastructure and built environment	**ARA 4** Ecosystems and ecosystem services
Outcome 1: Reduced GHG emissions from the transport sector	☐	☒	☐	☐	☐	☐	☐	☐
Outcome 2: Urban transport systems less vulnerable to climate extremes	☐	☐	☐	☐	☐	☐	☒	☐
Outcome 3:	☐	☐	☐	☐	☐	☐	☒	☐

Electric grid more resilient to climate events								
Outcome 4: Improved public and private sector capacity and regulatory environment	☐	☒	☐	☐	☐	☐	☒	☐

Co-benefit number	**Co-benefit**					
	Environmental	**Social**	**Economic**	**Gender**	**Adaptation**	**Mitigation**
Co-benefit 1 Improved air quality	☒	☐	☒	☐	☐	☐
Co-benefit 2 Increased usage of PT and NMT	☐	☐	☒	☒	☐	☐

B.3. Project/programme description (max. 2500 words, approximately 5 pages)

PROGRAM DESCRIPTION

The Program links EV deployment with sustainable urban mobility solutions through bus lanes, bus system upgrades, bus route restructuring, smart fare systems, and urban interventions in public spaces surrounding e-bus stations and terminals to facilitate and foster the use of PT, NMT and electric micro-mobility. This shall result in low carbon and resilient sustainable urban transport systems. Electric buses can thereby be the trigger to modernize and upgrade the PT sector and to improve its acceptance and image amongst the public.

The Program links mitigation with adaptation efforts and includes activities to increase the climate resilience of urban transport infrastructure as well as increased climate resilience of the power sector, latter especially in SIDS. This includes (i) adapting the design of IEUTS to potential climate associated risks; (ii) structural and non-structural measures to increase the climate resilience of urban transport infrastructure within the IEUTS; (iii) pilot project with V2G in SIDS and infrastructure for testing of peak shaving and as storage option to increase with a potential mass deployment grid resilience, (iv) assessment of options of 2nd hand EV battery usage to increase the grid resilience. Hydrogen as energy carrier is attractive because it can be stored and transported in a stable way and can add to a stock-based instead of a flow-based energy system with the advantage that demand must not match supply in real time. This can increase the grid resilience and can facilitate the achievement of a 100% renewable energy system. Additional adaptation efforts include strengthening awareness of climate hazards and risk-reduction processes of stakeholders to better manage program's financed infrastructure and associated ancillary equipment in light of new operational challenges created by climate threats.

The Program has an integral system approach for electric mobility including the vehicles themselves, the identification of the most appropriate charging infrastructure, depot infrastructure upgrades and upgrades to the grid. In the case of hydrogen pilot projects, the entire value chain from green hydrogen production, hydrogen storage, logistics/distribution, filling stations to Fuel Cell Electric Vehicles (FCEVs) is included. The Program however not only includes technical aspects but also matches electric mobility projects with the most appropriate business model and implementation structure.

The Program shall contribute to overcome the barriers to mass deployment of EVs. The Program has a comprehensive approach and combines targeted policy advice and CB to ensure a favorable e-mobility environment with financial instruments to ensure deployment of large-scale fleets. The operation of large-scale EV fleets works as proof of concept of their commercial viability and fosters a mass replication without further concessional finance. The Program can reduce risks through investment interventions combined with attractive and innovative business models appropriate for EVs such as separation of asset ownership and asset management, leasing systems and Private Public Partnership (PPP) schemes.

The Program is for commercial EVs and charging infrastructure only. Privately used passenger cars, motorcycles and vessels are not financed[35]. Commercial vehicles result in a much larger impact in terms of reduced GHG emissions and improved air quality and have significantly lower abatement costs than private vehicles due to being high mileage and larger vehicles. Concessional finance for privately used vehicles is socially inequitable and can result in a mode-shift towards private transportation. Commercial EVs targeted are primarily urban e-buses which have attracted the most attention from stakeholders and which are integrated with measures to increase the attractiveness, performance and resilience of cities. Other EV types potentially included are taxis/ride-hailing vehicles, trucks (especially for hydrogen pilots), vessels and mobile machinery e.g. forklifts or cranes. The Program does not increase the vehicle stock of taxis/ride-hailing vehicles compared to a BAU scenario but results in purchasing an electric instead of a fossil unit.

The Program only includes 100% EVs either as BEVs or as FCEVs powered by green hydrogen. Hybrid electric vehicles (HEVs) and plug-in hybrid electric vehicles (PHEV) are excluded. Latter are an intermediate technology. The average monitored emission reduction of hybrids is only around 20% (see Annex 2a). A review of >50,000 PHEV buses deployed in PR China revealed that the overwhelming share of these buses are never re-charged at the grid and thus only result in 20% energy and GHG savings (ADB, 2018). Exceptional cases where such buses can make sense are in cities with electricity supply problems[36]. PHEV taxis are commercially not attractive. The battery size of PHEVs is small resulting in an electric driving range of only 30-50km and models can only use AC slow chargers with a maximum

[35] Buses, taxis or vessels can be privately owned but vehicles are used for public or freight transport.
[36] This is the reason why plug-in hybrid buses and not full electric buses were purchased for the BRT Peshawar.

charge rate of 3.6kW which means more than 1 hour to re-charge their already small batteries. A recent study of ICCT revealed that commercial PHEVs only run 20% of real-world driving on electricity (ICCT, 2020). Also, PHEVs are more complex and expensive to maintain due to having both electric and internal combustion powertrains.

The Program only includes green H2 produced by using renewable electricity to electrolyze water[37]. This is pure enough for fuel cells used in transport application without further processing. This is the only method which can ensure zero GHG emissions. Blue H2 is produced from reformation of natural gas (methane) combined with carbon capture, utilization and storage technology with all its issues of energy usage as well as permanence of carbon capture and is thus not considered as zero GHG technology. Blue H2 also requires for use in fuel cells further clean-up. Grey, black and brown H2 use natural gas, coal or lignite for production. Pink, purple or red H2 is based on electrolysis using nuclear power[38]. Projects with H2 production must ensure that freshwater access is not an issue in water-stressed areas e.g. by usage of seawater using reverse osmosis for desalination in dry coastal areas.

The main motivating forces to foster e-mobility in the countries included in the Program are:

- Reduce GHG emissions;
- Improve air quality and reduce health problems associated with air pollution;
- Reduce dependency on imported fossil fuels and exposure to external price shocks;
- Positive economic and social impact due to reduced health costs, less fuel imports and job creation;
- Increase climate resilience of urban and grid infrastructure;
- Assess option of the hydrogen economy for the country.

MARKET ASSESSMENT

IDB has realized a **benchmark study on commercial e-mobility** to assess the technical options, major business models and financing structures prevalent in countries worldwide to foster commercial e-mobility (see Annex 2a).

The major results of the benchmark study on **Battery Electric Buses (BEBs)** are:

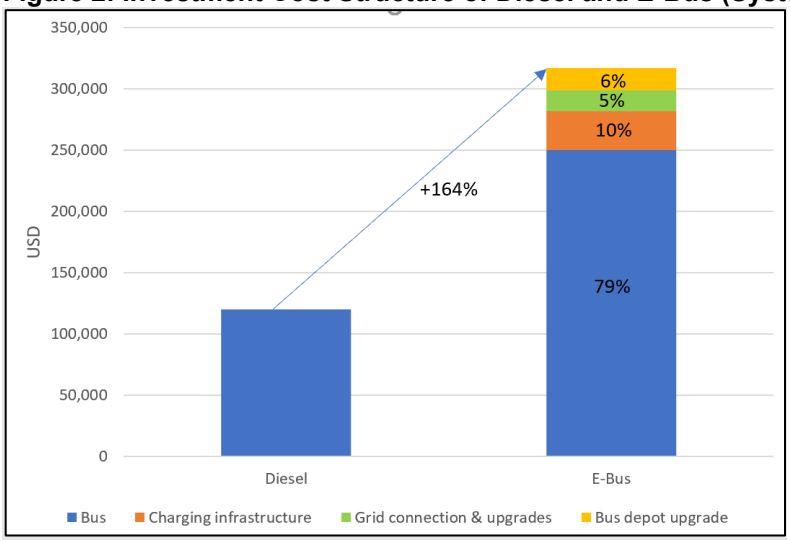
- Large-scale deployment of BEBs is still limited to few countries but picking up very rapidly. Whilst PR China still dominates in numbers of buses deployed, Indian, European and some Latin American cities are increasingly electrifying their fleets.
- BEB deployment requires a system design optimizing bus types and chargers. Investments need to be made in buses, charging equipment, grid connections and bus depot upgrades.
- Favorable BEB business models include bulk purchasing of buses and leasing structures limited to the bus or including also charging infrastructure, energy supply systems and bus depots. Leasing structures separating vehicle ownership and operations is interesting for BEB deployment as it resolves the problem of high upfront investments. Different types of companies have entered BEB leasing systems including electric utilities, investment funds and traditional finance institutions. However, the applicability of such business models might be restricted to large cities with a sound legal, regulatory and financial base.
- The total e-bus system requires a 2-3x higher investment than purchasing fossil buses[39]. This incremental investment can potentially be recovered with lower Operational Expenditures (OPEX)– however, the fact remains that more capital is required. For a traditional bus operator this results in a higher equity demand (buses are normally financed @ 60-80%) a higher debt load, and a higher guarantee demand (e-buses due to insecure re-sale value are not necessarily accepted by financial institutions at the same guarantee level; charging infrastructure and bus depot infrastructure are to a large part sunk costs). The operator/municipality could purchase with the same investment 2-3x more diesel buses and thus either expand public transport operations or renovate quicker a larger part of the fleet. The large incremental CAPEX thus poses more risk and more financial burden on private entities purchasing buses or on municipalities which might also have maximum lending levels linked to their tax revenue base.
- Total Cost of Ownership (TCOs) of BEBs are in many countries comparable or lower than of fossil units. This is related to lower OPEX and longer lifespan of BEBs with results depending on various critical assumptions

[37] Various colour codes are being used to differentiate the production method for hydrogen
[38] The hydrogen colour spectrum | National Grid Group
[39] This includes the e-bus, charging infrastructure, grid connection and bus depot upgrade see section 3.5. for incremental cost components

including the bus life-time, maintenance costs, energy usage, energy costs and battery replacement costs. All of these factors influence the result and are not yet well known. TCOs are based in general on static calculations not discounting future benefits and costs.

- The payback time of BEBs is in general very long (> 8 years) and sometimes exceeds the commercial vehicle lifespan thus making investments non-feasible. The Financial Internal Rate of Return (FIRR) is in general below the Weighted Average Capital Cost (WACC) and does not warrant the considerable risks involved.
- The risks of the new technology are not adequately reflected in the FIRR. Loan payments for e-buses are well known – however, savings are based on assumptions concerning electricity usage, the future development of diesel prices, maintenance costs as well as bus performance including bus availability rates. High upfront investments of e-buses are thus a fact whilst savings over lifetime are a possibility and not a given. Risks include those related to (i) technology performance (e.g. actual electricity consumption influenced strongly by heating/cooling which can result in operational problems as electricity consumption will influence the bus range); (ii) risks related to the lifespan of equipment (including the bus itself, batteries and charging equipment); (iii) risks related to a change of bus providers (major e-bus providers are from PR China which has not been previously a common bus providers in many countries); (iv) risks related to maintenance and repair costs including costs of spare parts; (v) risks related to bus availability rates; (vi) operational risks due to reduced flexibility (e.g. buses cannot be used on all routes and at all times);
- The lack of large fleets results in skepticism concerning the reliability and performance of BEBs and a potential lack of know-how on e-bus maintenance. Also, spare parts are scarce in the country without deployment of large fleets. No operator wants to be the first-mover and take the risk, although many acknowledge that this might be an interesting investment.
- Regulations are often not conducive for BEB investments e.g., the length of concession contracts is often too short for long-term investments, vehicle transfer in case of operator bankruptcy is unclear (creating problems for leasing companies) or tariff systems do not take into account EVs. Many cities for example give concession periods for PT operators of 8 years which are insufficient to recover all investments related to e-bus systems. Cities such as Bogota or Santiago de Chile have therefore extended concession periods for PT operators using electric buses thereby allowing them to operate longer assigned routes which allows them to recover their investments and contributes to make e-bus investments more attractive than fossil bus investments.
- Countries with large fleets of BEBs have **all** supplied significant upfront subsidies to cover 80-100% of the incremental CAPEX of BEBs and in most cases also finance the charging infrastructure and other BEB system components. This is done independent of TCO calculations. Without investment subsidies BEB deployment on a mass scale will take at least another 5-10 years until BEB investment costs are comparable to those of fossil units and performance risks are perceived by operators to be manageable.
- The experience of BEB incentive programs is that these schemes can be scaled back quickly after deployment of initial large fleets. This together with the global price decrease of BEBs and charging infrastructure gives a clear indication that initial investment subsidies are required but will only be needed temporary.

Figure 2: Investment Cost Structure of Diesel and E-Bus (System Cost per Bus)



Note: Based on urban 12m bus

Source: Grutter Consulting; see Annex 2a; based on average actual costs of investments realized in e-bus systems of various countries in the last 3 years

New business models (see for more details section below) based on separation of asset ownership and operations require risk instruments to be in place e.g., fare systems managed by third parties with automated debiting to the vehicle asset company to ensure payments, vehicle transfer agreements in case of operator default, vehicle insurance systems or bankable concession contracts.

The major results of the benchmark study on **electric taxis** are:

- Mileage and utilization rate of taxis is often very high. Frequently more than 1 driver shares the cab which can be in operations for 24/7. Slow-charging at home is thus in most cases not a feasible option. High-range EVs require home-charging of 8 or more hours, even if installing a Type 2 charger at home. This means that e-taxis not only require a large battery set to enable a long range, but also need to have fast-chargeable batteries and a network of fast chargers. As example a claim given by taxi drivers in Washington, DC, states that the Nissan Leaf in the fleet take too long to charge and sometimes require going well out of the way to find a publicly accessible charger. The city offered a series of grants to offset the cost of purchasing EVs, but drivers said they ended up losing income because of the charging difficulties.
- In many countries with initial e-taxi fleets subsidies cover at least 50% of the incremental cost. However, investment subsidies only for vehicles are insufficient. A fast-charging network is at least as important. Non-monetary incentive policies are also an important driving force. These include privileged ranks at popular waiting sites e.g., train stations or airports, usage of bus lanes, access to taxi licenses, limitation of city centre access for fossil taxis, usage of e-taxis on all days whilst fossil units have usage restrictions etc. Getting priority at a taxi rank can for example be more valuable than a subsidy scheme as it results in more clients and a reduced waiting time.
- Electrification of taxis requires a systematic and combined approach of incentives of financial and other nature with the establishment of a well-planned fast-charging infrastructure with priority for e-taxis and good coordination and information of taxi owners to inform them of important aspects of e-taxis. Without public finance a fast-charging network in the density required cannot be established.

The major results of the benchmark study on **electric vessels** are:

- Small electric vessels have a TCO which is lower than of fossil units, especially due to low maintenance costs. However, this is basically true for low-powered, slow-moving vessels. Upfront costs are around 50-200% higher than for conventional units. Retrofitting is possible but should only be done of good quality boats.
- Electrification of medium sized vessels e.g. ferries operating on short routes is a feasible option and reduces air as well as water pollution. However, such electric vessels are still at an initial stage and require adequate design including an integration of the charging infrastructure, pier upgrades as well as upgrades to the grid.
- Financial support schemes are required to reduce the upfront incremental cost as well as to ensure profitability of operations. This is applied by countries which have succeeded in getting electric vessels into operations. An additional important element especially for medium sized vessels is to establish (fast) charging infrastructure at ports and at stops of ferries.

Electric vessels are especially attractive for shorter distances and inland waterways or coastal activities. Long-haul maritime transportation requires other solutions such as e-fuels (e.g. e-methanol, green ammonia or green hydrogen). Sub-Projects shall be selected which have the potential to run a large amount of commercial electric vessels used for passenger transport, fishing or cargo transport within these conditions where battery electric propulsiton technology can be realized in the short term at commercial terms.

The major results of the benchmark study on **hydrogen usage for transportation** is:

- Hydrogen usage for transport is most promising in long-haul heavy-duty vehicles where BEVs have serious shortcomings due to low energy density of batteries resulting in large battery sets with a high weight and a large volume plus requiring high powered chargers on-route. Other applications of H2 in transport are e.g., for replacement of diesel trains on rural / low frequency tracks and in short-medium distance maritime transport.
- The major challenges of FCEVs are that it requires a different filling infrastructure and coordinated efforts along the entire value chain of hydrogen production, storage, distribution, delivery and usage.

- Hydrogen usage in transportation is still at an initial stage and commercially not yet viable. However, H2 production cost trends, FCEV cost trends and cost trends of fossil fuels point to H2 trucks being commercially viable by the end of the decade. For this to happen it is important to establish initial pilot experiences and to foster business models along the entire value chain integrating main stakeholders and reducing technology risks to initial transport operators. This can be done e.g., through pay-as-you-go models as successfully applied with H2 trucks in Switzerland.

PROGRAM STRUCTURE

Through the Program, GCF financing of 200 MUSD will leverage 250 MUSD in IDB and national financing to support around 16 low-emission projects with total costs of 450 MUSD.

FINANCIAL SUPPORT INSTRUMENTS AND TERMS

Funds will be provided, alongside IDB Sovereign Investment Loans and Grants, to borrower Host Countries or other IDB eligible borrowers, for financing Sub-Projects, either directly or through a LFIs. In either case, provision of funds will be to Sub-Projects that comply with the eligibility criteria and conditionalities given (see "Project Eligibility Criteria" below). The level of support is determined per project type to get to the minimum concessionality level (see the following table).

Table 2: GCF Loan and Grant and Co-Finance Shares of Total CAPEX of Project[40]

Project Type	max. GCF loan share	max. GCF grant share	min. co-finance share
Component 1: Increase climate resilience of urban transport infrastructure	90%	50%	10%
Component 2: Increase climate resilience of grid with H2 and V2G pilot projects	80%	30%	20%
Component 3: Electrified integrated urban mobility Public transport and NMT measures	50%	25%	50%
Component 3: Electrified integrated urban mobility Buses and others	40%	0%	60%
Component 3: Electrified integrated urban mobility Electric vessels	70%	30%	30%

No investment grants are given by the GCF for commercial EVs including e-buses, e-taxis or other electric fleets. Such vehicles do however need financial support which shall be obtained from government sources. Pilot electric and FCEV vehicle programs shall receive limited grant support by the GCF related to being first-of-its kind with novelty costs and high risks. All pilot projects must include a business design which allows for widespread commercial replication. Investment grants are to finance also adaptation measures in Components 1 to 3.

The proposed terms for GCF funded Sovereign Investment Loans are related to GCF financial terms for high concessionality and low concessionality.[41] GCF high concessionality terms will be applied to sovereign investments related to adaptation.

The same financial hurdles are faced if vehicles are operated and owned by a private or a public entity. Program finance will not result in competitive distortions or favoring of specific private service providers as loans for taxis and private

[40] The sum of maximum GCF loan and grant share is not equal to 100% minus co-finance as GCF shares are maximum i.e. in general the project cannot receive from loans as well as grants the maximum share. Based on the individual project the minimal concessionality required is defined which can result in some projects with a higher grant (and lower loan) share and other projects with a higher loan (and lower grant) share. The maximum GCF loan share and the minimum co-finance share add to 100% in case of not using any investment grants.

[41] High concessionality: Tenor 40 years, grace 10, pricing 0%. Low concessionality: tenor 20 years, grace 5 years and pricing 0.75%

institutional vehicle fleets are given through open-access FIs and loans to private or public owned public transport operators are based on competitive bidding or other equal access mechanisms.

In absence of this financial support, investment in fleets will not take place. Initial financial support for large-scale fleet deployment of electric buses is critical and the international experience in this area is clear: No country worldwide has been able to deploy on a large-scale fleets of BEBs without financial support:

Table 3: Investment Grants for E-Bus Purchase of Countries with large E-Bus Fleets

Country	Incentive
China	100% of incremental bus cost subsidized; chargers and grid connection up to 100% subsidized; electricity price initial 3-5 years subsidized; decreasing rates since Program start in 2009
India	80-100% of incremental bus cost subsidized in Fame II; chargers subsidized. FAME I 2015-2019 had 20 percentage points higher subsidy levels than FAME II
Germany	80% of the total incremental cost of BEBs and 40% of costs for charging infrastructure, grid connection, bus depot upgrades subsidized plus coverage of 100% of costs for the establishment of new maintenance centers
Switzerland	80-100% of incremental costs of BEBs and 100% of charging infrastructure and grid connection costs
UK	75% of incremental bus and charging infrastructure costs subsidized under Phase II (since 2019); under Phase I (2016-2019) 90% of incremental costs were financed
Poland	100% of incremental cost of entire e-bus system subsidized
USA	90% of incremental cost of entire e-bus system subsidized
Colombia	100% of incremental CAPEX of entire e-bus system was paid in Medellin and Phase I in Bogota. 100% of incremental total lifetime cost of e-bus system (CAPEX plus OPEX) subsidized in Phase III in Bogota (16% incremental cost compared to fossil units)[42]
Chile	100% of incremental cost of entire e-bus system for Phase I (200 buses) subsidized with monthly installments during 10 years; phase II longer concession periods for e-buses compared to conventional units (+40%) and additional points in tenders

Source: Grutter Consulting (2021), (Annex 2a).

Countries consistently subsidized 80-100% of the entire e-bus system incremental cost for the initial phase. The experience shows that once a large fleet is established subsidies can be reduced gradually and even be eliminated due to more competitive prices of e-buses combined with the experience of mass operations of e-buses. Concrete examples are[43]:

- In PR China, the average subsidy level per 12m urban e-bus decreased within 5 years from 150,000 USD per bus to 30,000 USD per bus and is expected to be fully eliminated by 2022 (ADB, 2018).
- In India, under FAME I 2017-2019, e-buses were subsidized with 60% of incremental costs. This was reduced to 40% under FAME II 2020-2021 (40% of a lower absolute value meaning absolute subsides where reduced by more than 50% within 2 years).
- In the UK, the 1st scheme for low carbon buses (until 2017) subsidized 90% of the incremental cost and the 2nd scheme, since 2018, 75% of the incremental cost of e-buses (including charging infrastructure).
- Chile subsidized for the first lot of 200 electric buses 100% of incremental costs. The next lots received no more investment gap subsidies but some additional benefits for e-buses relative to fossil units in tenders which is translated into higher payments per distance driven or per service unit for e-buses (TransMilenio, Colombia analyzed the tenders of Santiago and estimates the subsidy as 16% of total costs per km[44]).

Countries with a e-taxi fleets which go beyond pilots have put significant incentives in place. The following table summarizes incentives provided by different countries.

Table 4: Incentives for E-Taxi Purchase (Subsidies)

Country	Incentive

[42] Phase II had no subsidies or technical points advantage for e-buses and all contracts were awarded to fossil bus systems as e-bus offers were non-competitive; phase III gave additional points for e-buses compared to fossil units which allowed to the offeror of e-buses to be competitive with a significantly more costly financial offer as this was compensated with additional free technical points for e-buses – TransMilenio estimated that this resulted in a lifetime sur-cost for e-buses paid by the government of 16%.

[43] See Annex 2a

[44] Grutter Consulting, personal communication with TransMilenio

PR China	Subsidy of 11,000 USD in Bejing covering 100% of the incremental investment cost
Chile	Subsidy of 10,500 USD covering 60-70% of the incremental investment cost
Colombia	Subsidy of 5,000 USD plus no driving restrictions plus ability to charge 25% higher fee
Netherlands	Subsidy of 6,000 USD per vehicle plus establishment of fast-charging stations for taxis. By 2025 only 0-emission taxis are allowed to operate.
UK	Purchase subsidy for electric taxi of 9,000 USD per vehicle[45] plus requirements in cities such as London that taxis since 1.2018 need to have a 30-mile 0-emission capability for a new licence, plus subsidies for home-chargers plus establishment of fast-chargers in urban areas partially exclusively for taxis.

Source: Annex 2a

Initial subsidies cover at least 50% of the incremental cost. The case of various countries however also clearly shows that investment subsidies only for vehicles are insufficient. Home-charging is not a solution for most taxi drivers. This has been recognized by California as well as cities such as Amsterdam or London which are offering a full package including subsidized vehicles, an urban fast-charging network with DC chargers of 50-150kW plus non-financial incentives or regulations which give preference to e-taxis at attractive sits (e.g., airports) or which restrict usage of fossil vehicles. Stand-alone vehicle subsidies are clearly not a solution to the problem and should be matched with regulatory measures which require taxi and ride-hailing services to go electric within a given time frame e.g., by 2030. The Program will therefore only invest in taxi projects where a roadmap towards full electrification is available and linked with regulatory measures.

DELIVERY CHANNELS AND NEW BUSINESS MODELS

Sovereign Investments Loans (funded with GCF and/or IDB resources) and Investment Grants (funded with GCF resources) will be provided by IDB to eligible sovereign borrowers and will be executed by EEs identified in the corresponding Subsidiary Agreements. The possible contractual structures that could be used for the Program, depending on the type of Sub-Project, which will be reviewed, analyzed, detailed, and/or modified as needed on a case-by-case basis is mentioned in Section B.4 of this Funding Proposal.

OBJECTIVES, IMPACTS AND OUTCOMES

The Program supports a paradigm change to low-emission and resilient transportation systems. The Program shall overcome the barriers identified to kick-start the mass deployment of commercial EVs. The following outcomes shall be achieved:

- (1) An urban transport system which is less vulnerable to extreme climate events by implementing climate-proof urban transport infrastructure which is expected to reduce the vulnerability of cities and their transport system to climate hazards.
- (2) An electric grid which is more resilient to climate events through the possibility of using hydrogen and EV batteries as energy storage providing electricity during climate hazards.
- (3) Reduced GHG emissions from commercial vehicles. EVs have significantly lower lifecycle GHG emissions than fossil units in all countries included in the Program. Mode shift to NMT and electric micro-mobility results in additional GHG reductions.
- (4) Improved public and private sector capacity, including for the development of human capital, and a more favourable enabling policy framework for low carbon and climate resilient transport.
- Improved air quality: EVs have no combustion emissions and are a crucial instrument to achieve clean air in cities. Commercial vehicles are a major source of $PM_{2.5}$ and NO_x emissions in cities.
- Reduced energy dependency: EVs use domestic resources and reduce reliance on imported fossil fuels. They thereby also increase the resilience of the country's economy to external oil price shocks.
- Increased energy efficiency: BEVs are up to 4x more energy efficient than fossil vehicles. Electricity consumption even if pursuing an ambitious EV penetration level is marginal compared to production levels – however, localized grid problems need to be addressed.

The expected GCF fund-level impacts are reduced GHG emissions through increased access to low-emission transportation resulting in direct emissions reductions of 7,547,602tCO_{2e} over the asset lifetime of investments co-

[45] EV and EV Charger Incentives in Europe: A Complete Guide for Businesses and Individuals (wallbox.com)

financed by the Program, plus nearly 1.5 million direct and 9 million indirect beneficiaries of adaptation measures representing 9% of the entire population of Program countries.

PROGRAM COMPONENTS

The Program is structured in 4 components:

- Component 1: Increase climate resilience of urban transport infrastructure
- Component 2: V2G and H2 pilot projects to assess the potentials and viability of such interventions for increasing the grid resilience
- Component 3: Electrified integrated urban mobility
- Component 4: Technical assistance

Component 1: Increase climate resilience of urban transport infrastructure

The outcome of this component is (1) Urban transport system less vulnerable to climate extremes.

To increase climate resilience of the IEUTS, it is important to understand the climate hazards conditions at which its infrastructure is exposed to and how vulnerable it is to climate stressors. The design and implementation of climate resilient transport infrastructure can prioritize such measures that mitigate the risk of transport system failures. Then, to better understand the conditions of urban transport infrastructure in the selected cities, a risk identification methodology is proposed following a quantitative disaster and climate change risk assessment for the IEUTS (see Annex 2b). The outputs of this analysis will estimate the incremental costs related to climate change and perform economic analysis for the pre-feasibility stage of the implementation of urban interventions considered as adaptation measurements. This analysis carries out a quantitative assessment of the baseline risk conditions (current risk), as well as under climate change scenarios and adaptation alternatives, for (i) the network of routes of the bus system and (ii) terminals, bus stops, maintenance facilities, charging centers and parking yards of the system. Adaptation measures, considering nature-based solutions, can be derived from projects underway in the city. The methodology defines climate resilience criteria that allow an analysis of the bus routes that may be beneficiaries of electro-mobility considering the urban interventions carried out along the route and its components (terminals and stations) and make an economic evaluation of the benefits of implementing adaptation measures and their impact on the resilience of the city's public transport system. To contribute towards local transformative adaptation processes, the Program will use the Disaster Risk Assessments and Management Plans (DCRMP) as inputs to develop at least one regulatory system for the IEUTS operators, that improve investment and sustainability incentives for climate resilience and EV, by defining clear guidelines for the planning, design and operation of the system to make it reliable to future climate.

The outputs of this component are (1.1.) Fewer urban infrastructure damaged resulting from climatic shocks because of higher investments in vulnerability reduction and (1.2) Fewer days to restore the IEUTS's public transport service after climate shocks due to investments in climate resilience.

The activity of this component is 1.1.1 Implement measures to increase climate resilience of urban transport infrastructure. This component will finance (i) the development of climate-resilient micro mobility infrastructure; (ii) the allocation and improvement of supporting urban spaces and infrastructure for public e-transport addressing men and women's differentiated needs when using public transportation. The Program will prioritize solutions that integrate into the urban fabric, are compatible and conducive to modes of sustainable mobility guaranteeing universal access, have important elements for NMT and electric micro mobility such as electric cycles, shared mobility schemes or special lanes for micro mobility users and incorporate a gender perspective. This can include the infrastructure connecting public transport systems to alternative modes of urban mobility (electric and non-motorized) such as cycling lanes, pedestrian streets, etc., and/or providing the infrastructure conditions to facilitate these alternative modes of urban mobility as bicycle parking, park and ride, waiting areas, charging areas etc. The Program will also finance all supporting urban spaces and infrastructure for public e-transport. It will target projects that lead to the generation of qualitative, accessible, and safe environments around public transit nodes, such as parks, boulevards, terminals, transport stops, etc.

The activities address the barrier of lack of financial support for climate vulnerability investments.

This component will be implemented directly with transport operators, with local and national government agencies, power utilities, and with financial and intermediary agents that develop urban mobility and infrastructure solutions. It will include modalities for developing PPPs and SPVs. The main funding mechanisms are Sovereign Investment Loans and Grants.

Component 2: V2G and H2 pilot projects to assess the potentials and viability of such interventions for increasing the grid resilience

The outcome of this component is (2) The potential of H2 storage and V2G to increase the grid resilience has been assessed.

This component addresses the barriers of limited commercial attractiveness of e-mobility and performance risks of EVs and also includes specific investments on adaptation such as V2G and infrastructure for peak shaving, both measures aimed at increasing grid resilience.

The output of this component is (2.1.) H2 and V2G pilots are used to assess their viability of mass deployment to improve grid stability.

The activities of this component are (2.1.1) H2 projects with FCEVs & with grid stabilization measures implemented; (2.1.2.) V2G projects with grid stabilization measures implemented. (2.1.3) Feasibility of V2G and H2 storage as cost-effective means for increasing grid resilience assessed. The component finances (i) pilot green hydrogen projects with usage in transportation which work along the entire value chain of the hydrogen economy including hydrogen production, storage, distribution, filling stations and its usage in transportation. All pilots must have a business model which allows for massification on commercial terms. Private usage vehicles including passenger cars are not financed i.e. the Program encompasses only commercially used vehicles with a focus on long-haul trucks and buses, mobile machinery and vessels where H2 usage is considered to be the efficient and effective as zero emission technology; (ii) V2G pilot projects are used to assess the technical and commercial viability as well as barriers to and potentials to use e-mobility and V2G as a cost-effective means to increase the grid resilience with a focus on SIDS; (iii) additional storage infrastructure, a stationary fuel cell and other components to assess the technical and commercial viability and cost-effectiveness of using H2 for peak shaving to increase grid climate resilience. The Program supports the establishment of hydrogen production infrastructure, FCEV vehicles, filling stations and equipment for hydrogen storage, stationary fuel cells for electricity production and re-insertion into the grid incl. converter and cabling plus grid adjustments for testing the usage of H2 for grid stabilization and increased grid resilience. The value chain approach is important as a business model to allow for a widespread application and to avoid stranded assets. Investments are however in pilot projects and their infrastructure which are not commercially oriented but for piloting and testing the technology. Direct H2 usage in vehicles is not common although it can be used potentially for vessels. Alternatives of retrofit versus new-built vessels are assessed in projects which work with H2 vessels. For trucks and other vehicles FCEVs are used i.e., H2 is used to produce on-board electricity for traction and storage in a small battery. Only projects running 100% on green hydrogen are included. Green H2 is based on renewable energy sources. In the case of Paraguay, the electricity will be taken from the grid, which is 100% renewable and to a large extent based on hydropower. For Uruguay the situation is similar with large shares of electricity being also produced by wind power. In the case of Chile solar systems will produce the required electricity for green H2 production.

The activities address the barrier of lack of financial support for climate vulnerability investments.

The following table shows initial indicative Sub-Projects to be considered for financing. The main funding mechanisms are Sovereign Investment Loans and Grants.

Table 5: Indicative Initial Sub-Projects under Component 2

Country	Components	Investment (MUSD)					GHG reduction tCO_{2e}[46]
		GCF loan	GCF grant	IDB	Local	Total	

[46] Lifetime project

Chile	H2 pilot project	4	2	2	2	10	10,000
Paraguay	H2 pilot project with trucks	4	2	3	2	11	10,000
Uruguay	H2 pilot project	4	3	2	2	11	32,000
Barbados	V2G pilot project	2	1	1	1	5	5,000
Jamaica	V2G pilot project	2	1	1	1	5	5,000

Brief H2 Pilot Project Paraguay (see Annex 2c)

The project is a demonstration cum pilot project which shall be the catalyzer for the development of a hydrogen economy in Paraguay. Paraguay has vast renewable energy as well as water resources whilst fossil fuels need to be imported. The demonstration project shall create capacities and know-how among stakeholders on how best to develop the hydrogen economy. The project includes production of green hydrogen based on electrolysis at 3 strategic locations with small plants and the usage of hydrogen in different types of vehicles with a focus on heavy duty trucks where hydrogen has its competitive advantage. The project shall produce some 120 tons of H2 annually and includes 3 heavy-duty trucks, 3 passenger cars and 3 light commercial or utility vehicles. Additionally, the viability of using H2 on vessels will be assessed. The pilot project shall also create the information, know-how and identify the components of a business case for applying hydrogen storage to increase grid resilience and has as objective to demonstrate that (i) a fuel cell can support the grid at times of peak load by producing electricity from hydrogen; (ii) a fuel cell can act like a back-up in case of a disconnection from the main grid. It therefore also includes a 250 kW fuel cell and connections to the LV switch board idem to the electrolyzer. The project also includes TA to create capacities on hydrogen technology at the different stakeholders, training of technical staff and the development of business models which make the adoption of hydrogen technology commercially viable. The total budget of the project is 11 MUSD of which 9.5 MUSD for the demonstration project including grid resilience measures, 1 MUSD for TA and 0.5 MUSD for project administration.

Brief V2G Pilot Barbados (similar project for Jamaica)

EVs can enable utilities to balance loads through V2G technology which is a particularly useful application for the integration of variable renewable energy such as wind and solar. EVs can be charged when VRE sources provide excess supply, or when power demand is low. When power demand is high, they can reinject power into the grid thereby reduce the need for new capacity, make the power system more efficient and facilitate the introduction of more VRE into the grid. EVs can also be used to bolster disaster resilience. EVs can be used to transport doctors and emergency supplies amid severe fuel shortages and to provide electricity from EVs during outages e.g. caused by hurricanes. The project seeks to to test the ability of EVs to provide grid services including peak shaving, disaster relief and supply services during power outages. It shall also allow to identify the most appropriate vehicle segments and charging systems and the commercial viability compared to other storage options. The project consists of 10 electric school buses with a relatively large battery set. School buses have the advantage of limited day usage and therefore long potential grid connection times which can be used for load balancing. Together with the 10 buses 10 bi-directional chargers are purchased. The total investment in the pilot project is 5 MUSD of which 3 MUSD for vehicles, 1 MUSD for chargers and connections and 1 MUSD for testing and pilot project management

Component 3: Electrified integrated urban mobility

The outcome of this component is (3) Reduced GHG emissions from commercial vehicles.

This component addresses the barriers of limited commercial attractiveness to invest in e-buses, performance risks of e-buses, limited know-how and experience with cost-effective measures to increase the resilience of urban transport infrastructure, and lack of financial support for investments to reduce climate vulnerability of urban transport infrastructure.

The outputs of this component are (3.1.) E-mobility is integrated with PT & NMT measures to foster mode shift to low carbon transport; (3.2) EV fleets are deployed with innovative business models to enable their mass application

The activities of this component are (3.1.1) Construction of cycle lanes and micro-mobility measures; (3.1.2) Implement urban mobility measures such as pedestrianization, bus lanes & route structuring; (3.2.1) Deployment of e-buses; (3.2.2) Deployment of e-taxis & fleets with urban fast charging infrastructure; and (3.2.3) Deployment of pilot projects with electric vessels.

The goal is to deploy large-scale fleets of public transport e-buses that provide a reliable and sustainable service to the city. This can include different e-bus technologies and bus sizes (slow-, fast-, opportunity charged buses, hybrid trolleybuses). The targeted BEB fleet size is 50 or more units per city[47]. The Program will not finance pilot projects of less than 20 buses. Business models and financial structures are defined per project based on local circumstances. This can include separation of ownership and operations of buses, e-bus-leasing systems or PPPs. E-bus projects will be embedded with urban sustainable mobility programs including the design and implementation of adaptation measures (as explained above) as well as improved NMT, micro-mobility, and mobility accessibility. Alternative and new modes of urban mobility are changing the urban mobility infrastructure. Common urban spaces and new urban mobility services facilitate the independence and mobility of all residents and are key to promote sustainable, competitive cities while increasing the quality of life of citizens taking into account the different mobility patterns in women and men. Public spaces for mobility such as bike lanes, pedestrian lanes, mixed mobility lanes (buses, bikes, 3-wheelers) shall be properly integrated into the urban space to further improve cities' quality of life and climate resiliency. All projects include a comprehensive capacity building for training and capacity building part and serve as input for the development of an action-oriented roadmap for the electrification of public transport. Innovative business models to be deployed include a separation of ownership and operations of assets, pay-as-you-go models and bulk purchase models (see “Delivery Channels and Business Models” above).

The component finances commercially used EVs including buses, vessels, taxis/ride-hailing vehicles, last-mile delivery service vehicles, trucks, and institutional fleets. It does not finance private usage vehicles including passenger cars or motorcycles.

The following table shows initial indicative Sub-Projects to be considered for financing. The main funding mechanisms are Sovereign Investment Loans and Grants.

Table 6: Indicative Initial Sub-Projects under Component 3

City, Country	Components	Investment (MUSD)					GHG reduction tCO_{2e}[48]
		GCF loan	GCF grant	IDB	Local	Total	
Panama City, Panama	100 12m e-buses; PT enhacement: NMT and micromobility; climate resilient infrastructure	25	13	28	7	73	1,139,000
Manizales, Colombia	50 12m e-buses; restructuring and upgrading of PT system; NMT and micromobility; climate resilient infrastructure	8	3	15	3	29	365,000
Asuncion, Paraguay	50 12m e-buses; upgrading of PT system; NMT and micromobility; climate resilient infrastructure	8	2	15	3	28	1,593,000
Santo Domingo, Dominican Republic	250 electric taxis plus fast charging urban infrastructure	2.7	0	4.6	2	9.3	29,000
Cartagena, Colombia	Electric vessel project	4	2	3	2	11	131,000
Costa Rica	Electric vessel project	2.5	0.5	1	1	5	66,000

[47] Fleets of 50 or more units are far more cost effective and allow for efficient usage of charging infrastructure and grid upgrades. They also result in more reliable operations due to availability of technicians from the manufacturer on-site and sufficient spare parts.

[48] Lifetime project

Brief Panama City Project

The Panama City project aims at providing a resilient public transport service in Panama City. The project builds on previous analyses and ongoing pilot projects in the city[49]. To increase the resiliency of the urban transport system the urban infrastructure will be electrified and upgraded and/or adapted as well as its surrounding urban public areas.

The project will (i) introduce 100 12m e-buses and its associated infrastructure to the city distributed over 7 bus routes which have been preidentified in the World Bank study[50]; (ii) design and (re)develop public spaces around public transit nodes of these 7 e-bus routes guaranteeing universal access of all citizens, and fostering and facilitating the use of public transport and alternative modes of urban mobility such as NMT and electric micro-mobility; (iii) design and implement urban adaptation measures along the route and around stations, access areas, terminals and charging stations to contribute increasing climate resilience of the IEUTS; and (iv) increase institutional capacity to design, implement and operate climate-resilient IEUTS (including vulnerability/risks assessments and better managing uncertainty).

In order to implement this project different studies will be conducted: a quantitative risk assessment for hazards such as floods[51] and extreme heat[52] for the public urban transport system and its adjacent areas to identify adaptation measures (see Annex for details on the methodology); urban mobility and public spaces analysis around the different e-bus routes to identify and prioritize integrated urban interventions around public transit nodes that are resilient, accessible and safe, and incorporate infrastructure connecting public transport modes to alternative modes of urban mobility (electric and non-electric); the design for the implementation of the e-bus system on the 7 preidentified routes.

The quantitative risk assessment will analyze hazards such as floods[53] and extreme heat[54] for the public urban transport system in Panama City. This assessment will properly model and integrate the four components which make up a risk assessment: hazard, exposure, vulnerability, and risk. The risk assessment will consider multiple scenarios: (i) baseline climate conditions; (ii) conditions including climate change projections from ensemble Global Circulation Models; and (iii) risk conditions considering the implementation of adaptation measures, including simultaneous initiatives that are taking place in Panama City[55]. The assessment will report which components (road infrastructure, stations of terminals, maintenance facilities, charging stations) are critical to the operation of the system because of its vulnerability to climate-related hazards and develop a sensibility analysis to determine the criteria to prioritize each of the critical components to increase the resilience of all the urban transport systems. An economic analysis of the adaptation measurements can define which bus route to prioritize, with special attention in estimating the increased costs of the interventions due to climate change impacts and the potential reduction in losses following the implementation of adaptation measurements in the impact area of the route.

Brief: Electric Taxis for Dominican Republic

2 Private taxi operators are interested in incorporating around 250 electric taxis into their fleet. The taxis shall be financed through a loan (no grant component) through the national finance system. A pre-condition for successful operations is the establishment of an urban fast-charging infrastructure in Santo Domingo. The project includes the

[49] Hazards and Risk Study and Greenhouse Gas Inventory under the IDB's Emerging and Sustainable Cities Initiative from 2016; Analysis of electromobility solutions for public transport in Panama, Deliverable 5: Final report and recommendations. World Bank, 2021; and the ongoing e-bus pilot route in Panama's historic city center which is an initiative of the IDB through the Living Heritage program and the local bus authority MiBus

[50] World Bank (2021). Analysis of electromobility solutions for public transport in Panama. Report prepared by Deloitte Project ID: 1266780 as a part of the NDC Partnership.

[51] Data available from the baseline studies for the IDB Emerging and Sustainable Cities Program (ESCI) in Panama City, including high-resolution flood hazard maps and flood risk maps, available at https://issuu.com/ciudadesemergentesysostenibles/docs/panam__plan_de_accion_lr

52 EH-GLOBAL-VITO Extreme Heat map for T100, 20, 5 available online at https://thinkhazard.org/en/report/93693-panama-panama-panama/EH

[53] Data available from the baseline studies for the IDB Emerging and Sustainable Cities Program (ESCI) in Panama City, including high-resolution flood hazard maps and flood risk maps, available at https://issuu.com/ciudadesemergentesysostenibles/docs/panam__plan_de_accion_lr

54 EH-GLOBAL-VITO Extreme Heat map for T100, 20, 5 available online at https://thinkhazard.org/en/report/93693-panama-panama-panama/EH

55 Including, but not limited to: Plan de Resiliencia Panamá 100 Resilient Cities, ICES: Plan de Acción Panamá Metropolitana, Proyectos del Plan Estratégico de Patrimonio Vivo Panamá

purchase of 250 electric taxis including their home chargers, the deployment of 15 urban fast-chargers (presumably 100kW chargers) in the city and the establishment of incentives such as preferred access (no queuing) for the usage of e-taxis in the city in collaboration with the municipal government. At the policy level the project includes the establishment of a roadmap specifically for the electrification of taxis and ride-hailing services in the country. The estimated project investment is 9.3 MUSD of which 8.2 MUSD for vehicles and 1.1 MUSD for the charging infrastructure. Project finance is proposed at 30% with a loan from the GCF and 70% co-finance from IDB and the taxi companies. The expected GHG benefit over the lifetime of the vehicles is 29,000tCO_2. In total nearly 30,000 taxis and ride-hailing vehicles operate in the country and this initial project is an important component to gain experience and to kick-start massive electrification of this sector. The program will not expand the number of taxis but finance the purchase of electric taxis instead of fossil units.

Brief Electric Vessel Project, Colombia **(see Annex 2d)**

The objective of the pilot project is to contribute to the mass deployment of electrified mobility by piloting different types of electric vessels in Cartagena. The pilot project shall create capacities and know-how among stakeholders on how best to design and structure electric vessel projects and shall create information on the appropriate vessel design, charging systems and electric vessel operations. The proposed project has following components: (i) Deployment of 6 small 20 passenger electric vessels on different public transport routes; (ii) Deployment of 2 medium scale 200 passenger fast electric vessels for public transport routes with fast-charging technology for re-charge at piers during boarding and de-boarding of passengers; (iii) Technical assistance for design of vessels and charging infrastructure as well as for design of operational procedures; (iv) Capacity building of local and national authorities on regulatory and safety aspects of electric vessels; (v) Training and capacity building of vessel operators; (vi) Technical assistance for the design of business models to implement on a mass-scale electric vessels for passenger transport and for other fields of usage; (vii) Outreach and knowledge management products. A pre-feasibility study realized 2018 showed that increased water-based transport could reduce transport times, congestion, pollution and costs. Electrifying vessels would further reduce emissions and also results in lower costs, once the technology is established. The electric vessel routes serve a total population in the catchment area of 112,000 persons representing 11% of the urban population of Cartagena. A large share of people living in this area are poor and the residential areas are considered as vulnerable (Universidad Tecnologica de Bolivar, n.a.). The pilot has the potential to reduce more than 130,000 tCO_2 (lifetime vessels) as well as significant reductions of local pollutants with highly positive economic impacts and profitability. Electric vessels are not yet used except for very singular cases and only as small units in Latin America. However, a study by the IDB[56] analyzed a significant pipeline of ferry routes (132 under 750 km distance) and found that 52 of them (39%) could be feasibly switched to a mid-size ferry using current battery technology, representing a cumulative addressable market of $6.8 billion by 2040. No other program in the region has been implemented so far to address this market. This is why this pilot project has the potential to showcase the benefits of electric technology for vessels – not only for passenger transport vessels but also for short-haul cargo vessels, for cargo vessels and for vessels used for port management. This can result in a significant reduction of emissions and a transformational change of water-transport[57]. The impact also goes well beyond Cartagena to other coastal areas of Colombia, inland-waterway transport vessels as well as to other countries in Latin America. The total budget of the pilot is 10 MUSD of which 55% are expected from the GCF.

Component 4: Technical assistance

The outcome of this component is (4) Improved public & private sector capacity & regulatory environment for e-mobility**.**

This component addresses the barriers of (i) Business models & policies non-conducive to e-mobility deployment; (ii) Limited know-how on climate resilience measures in urban transport infrastructure; and (iii) Limited commercial viability of e-mobility linked with high upfronts and unclear operational costs and benefits. It also addresses the performance risk of EVs,

The outputs of this component are (4.1.) A climate resilient e-mobility ecosystem integrated with urban transport is established to enable uptake of e-mobility, and (4.2) Strengthened institutional and regulatory systems for climate-responsive planning and development.

[56] Opportunities for electric ferries in Latin America. Online: https://publications.iadb.org/en/opportunities-electric-ferries-latin-america

[57] Alone Cartagena could reduce annual GHG emissions by 60,000 tCO_2 with electrified vessels for passenger transport.

The activites of this component are (4.1.1) Urban interventions realized with a gender perspective; (4.1.2) Implementation of new business models for e-bus systems; (4.1.3) Design and promotion of EV conducive policies; (4.2.1) Apply methodology for climate risk identification; (4.2.2) CB and knowledge generation on H2 and V2G for increased grid resilience; and (4.2.3) Training & CB of stakeholders.

This component addresses the barriers of business models and policies non-conducive to e-mobility deployment, lack of skills and competences for e-mobility in the workforce, limited know-how on mainstreaming climate resilience into design, planning and operation of IEUTS and ineffective efforts to achieve gender equality. For more information on possible business models see Delivery Channels and Business Models above. Activity 4.1.2. proposes and discusses different business models with stakeholders and identifies the most appropriate business model based on the project context.

This component and associated activities provide technical assistance to enable effective financial assistance and to create a policy and business framework conducive for massive deployment of EVs. Activities are coordinated and realized together with national authorities to ensure complementarity of different endeavors. Adaptation related activities include capacity building such as training to improve IEUTS operation, improvement of existing IEUTS planning and design methodologies and processes to adequately manage uncertainty in the decision making, knowledge management strategies to facilitate the creation of benchmarks, regulations and norms for designing and operating IEUTS.

To address the technical assistance needs of each country and of each Sub-Project in particular, it is contemplated to work through TA packages for e-mobility at a regional, national and local level, TA activities for increased resilience urban and grid infrastructure and improved gender equality. This assistance packages will take the form of Technical Cooperation granted by the IDB with resources of the Program.

Within activity (4.1.3.) EV policies following sub-activities are made:

- **E-mobility conducive local ecosystem** established with activities related to the local environment such as business model design and development, advice on concession contracts for bus services (e.g. concerning concession length as this is important for e-bus deployment), capacity building and training of operators, safety staff, maintenance staff etc. Technical assistance is used to ensure delivery of adequate training from equipment suppliers or third parties for EV and charger operations and maintenance, safety trainings and capacity building in optimal management of EV fleets. This activity also includes performance monitoring of electric vehicles in technical (energy usage, emissions) and financial terms (operational expenditures, vehicle availability rates). **E-mobility conducive national ecosystem** established with activities such as design and divulgation of sectoral roadmaps (electrification of public transport, electrification of taxi and ride hailing services; electrification of urban delivery services, electrification of long-haul freight and passenger transport, electrification of the rail system, electrification of mobile machinery, electrification of vessels, hydrogen economy), support of national enabling policies for EV deployment, advice on battery re-usage, recycling and disposal and capacity building at a national level. This includes also policies which affect directly the investment components of the Program such as concession contracts and structuring of public transport. Sectoral roadmaps shall improve the framework conditions and enable large scale EV deployment in the areas financed and will help to inform and/or further detail the countries long term mobility strategies and their Nationally Determined Contributions (NDCs). Activities developed will be country specific and complementary to those realized by other entities, especially GEF, AFD, GIZ, BCIE (Central American Bank for Economic Integration), and the UN.
- **E-mobility conducive regional ecosystem** which is core for learning and experience exchange between countries with activities such as the realization of different knowledge materials including publications, webinars, benchmark and best-practice studies, and outreach events included in a learning and KMS. The Program will not create own platforms or channels for information dissemination but use already existing platforms such as the MOVE platform of UNEP. The MOVE platform is already fully funded and does not require additional funding but is interested in including more materials on its site to make it more attractive. IDB will thus feed this platform with reports and discussion papers. The platform realizes online training and provides for information and knowledge materials. A first package of assistance will be established at the regional level for SIDS countries. This will serve as a sharing platform to provide information and general technical assistance to create a community of practice in electromobility in aspects especially relevant for SIDS

such as the role of e-mobility in achieving 100% renewable electricity generation, V2G projects and usage of electricity, hydrogen or ammoniac for vessels.

The Program will realize under 4.2.1. 4.2.2 and 4.2.3. TA activities within the area of increasing the climate resilience of IEUT'S infrastructure and of grids to identify and assess cost-effective measures to increase the climate resilience of cities in transport infrastructure linked with e-mobility development and to increase grid resilience through projects on the e-mobility field such as V2G, hydrogen energy storage or usage of 2nd hand EV batteries. It will also include training to improve the way climate resilience is mainstreamed in existing processes for planning, designing, and operating IEUTS. The Program creates different knowledge materials including publications, webinars, benchmark and best-practice studies, and outreach events in this area that may lead to new regulatory systems for PT designers and operators.

The **Gender action plan** (activity 4.1.1.) will boost women's participation and gender awareness in the electromobility sector. They will (i) increase women's access to economic opportunities through the development of technical and entrepreneurial skills; the implementation of incentives to hire women; and the inclusion of gender eligibility criteria for the selections of the projects; (ii) increase gender awareness to recognize women as part of the electromobility sector and address their needs through the development of gender training, which must be included in any CB activity in the Regional Sectorial Council of Skills for Electromobility or any training activity in the Program; the inclusion of a gender perspective in the frameworks, including EV conducive policies which will incorporate explicit requirements for E-buses to assure universal accessibility and to address men and women's differentiated needs when using public transportation; the establishment of women's networks; and several communication activities; and (iii) increase gender activities, specially safety initiatives, in the projects financed with the development of a gender toolkit and gender case studies and the support in the development of gender action plan for the projects financed.

Under the activity (4.2.3) training and CB of stakeholders a Regional Sectorial Council Skills for Electromobility (RSCSE) is created which aims at improving sector productivity and contributing to a just transition, with solutions for the development of human capital (studies, standards, train the trainers, online courses, etc.) available to member countries. This Resource Center will develop labor market intelligence, labor and training standards, train of trainer's packages and learning resources, allowing to assist each of the member countries in the development of their human capital, in their transition to electromobility. Guidelines and recommendations for gender equality and inclusion in new skills and positions in the workforce will be established.

PROJECT ELEGIBILITY CRITERIA

All Sub-Projects financed by this Program must meet the following eligibility criteria:

In terms of eligible financial intermediaries for investment Sub-Projects:

- IDB eligible borrowers that include within their mandates the development and/or financing of local infrastructure and/or mobility assets at the local, national and/or regional level, including low-carbon infrastructure, mobility and renewable energy.
- For climate change mitigation focused subprojects, which target a reduction of GHG emissions, eligible investments should qualify as climate change mitigation finance as per the Joint MDBs-IDFC Common Principles for Climate Mitigation Finance Tracking. These should be included in the list of eligible categories (based on principles), demonstrate a reduction in GHG emissions against a baseline scenario and at least 50% of the total project cost should qualify as climate finance.
- For climate change adaptation / infrastructure resilience focused subprojects, which address current and expected effects of climate change and target an improvement in resilience or a reduction in vulnerability of affected population, eligible investments should qualify as climate change adaptation finance as per the Joint MDBs-IDFC Common Principles for Climate Adaptation Finance Tracking. These should intent to address the identified risks, vulnerabilities and impacts stated and able to demonstrate link between the identified risks, vulnerabilities, and impacts, and financed activities. At least 50% of the total project cost should qualify as climate finance.

In terms of financial instruments (Sovereign Investment Loans and Investment Grants):

- GCF total financing: not more than USD30 million per Investment Sub-Project.
- The Program aims to finance at least one Sub-project in each Host Country.

- Not more than 25% of GCF funds shall be invested in one specific Host country.
- Maximum GCF loan and grant and minimum co-finance shares of total costs per project in each component and subcomponent[58] should follow concessionality limits as per Table 2 of this Funding Proposal. As an example, co-financing requirements per Sub-project in component 2: minimum 20% co-financing of total Sub-project costs (including IDB Co-financing and other Co-financing) for H2 or V2G pilot projects.

In terms of Investment Grants:

- Investment Grants shall not be used to finance any commercial EVs including e-buses, e-taxis or other electric fleets in components 3.2.1 and 3.2.2.
- Pilot electric and FCEV vehicle programs shall receive limited Investment Grant support by the GCF related to being first-of-its kind with novelty costs and high risks. All pilot projects must include a business design which allows for widespread commercial replication.
- Investment grants are to finance also adaptation measures in Components 1 and 2.

Eligibility criteria per component:

- Applicable to Components 1,2, and 3:
  - All Sub-projects must prove a reduction in GHG emissions against a baseline and demonstrate a contribution to a co-benefit. The approach to be used is determined in Annex 22a to the Funding Proposal and is based primarily on UNFCCC methodologies registered under the Clean Development Mechanism (CDM).
  - Each Sub-project within Components 1, 2 and 3 will need to be screened against a climate related risk following IDB's Disaster and Climate Change Risk Assessment Methodology (DCRA). Projects resulting with a Moderate or High Disaster Risk Classification will complete a climate risk assessment.
  - Sub-Projects with exception of pilot projects must comply with economic viability threshold values of projects in accordance with IDB practices.
  - Safeguards: Compliance with IDB's environmental and social safeguards policies as outlined in the environmental and social management framework (see Annex 6). All Sub-Projects must have a positive sustainable development impact.
  - Sub-Projects must be in compliance with relevant national and local laws and regulations.
  - Each Sub-project shall have a gender action plan taking into account guidelines developed in Annex 8.
  - In the case of Colombia, the Program will limit financing to intermediate cities without established mass rapid transit systems.
  - Gender: All Sub-projects financed by the Program, including pilot projects, must include the IDB's gender alignment requirements, which are: (i) an analysis identifying relevant gender gaps, (ii) gender actions to narrow the gaps, (iii) at least one indicator to measure the progress of the gender actions (sex-disaggregated indicators do not qualify as gender related indicators), and (iv) allocated resources for the implementation of the actions. By the quality of these inputs the IDB will assess the EE's capacity to deliver on gender issues. If the input is not satisfactory, the IDB could provide additional support or suggest the hiring of an external consultant, depending on the project's complexity.

[58] The sum of maximum GCF loan and grant share is not equal to 100% minus co-finance as GCF shares are maximum i.e. in general the project cannot receive from loans as well as grants the maximum share. Based on the individual project the minimal concessionality required is defined which can result in some projects with a higher grant (and lower loan) share and other projects with a higher loan (and lower grant) share. The maximum GCF loan share and the minimum co-finance share add to 100% in case of not using any investment grants.

- Component 1. Increase climate resilience of urban transport infrastructure

  - EIRR – 12%

  - GCF Proceeds will finance only the incremental cost of adaptation related intervention as calculated in project's economic analysis (the Disaster and Climate Change Risk Assessment Methodology) will generate an economic assessment for the adaptation measures that will inform the project's economic analysis).

- Component 2. Increase climate resilience of grid with hydrogen (H2) and V2G pilot projects

- Only H2 pilot projects with usage of 100% renewable energy will be financed and where no conflict with freshwater usage occurs.

- H2 pilot projects in areas with limited freshwater availability must proof that the H2 production activity will not reduce freshwater availability.

- H2 projects with usage from grid electricity for hydrogen production will only be supported in countries with a grid factor below 0.1 kgCO2/kWh (currently Paraguay and Costa Rica) or where additional renewable electricity is generated by the project for hydrogen production.

- Component 3. Electrified integrated urban mobility:

- EVs financed: Only BEV or FCEV commercial vehicles including vessels and mobile machinery are financed (no vehicles for private usage);

- Retrofits: For road-based vehicles retrofits are only eligible if security can be duly justified according to national recognized standards. For vessels electric retrofits are eligible.

- Taxis and ride-hailing vehicles are only financed if the city or country has a roadmap and regulatory measure which results in a full conversion to electric taxis and/or ride-hailing vehicles latest by 2040.

- Other eligibility requirements:

- According to IDB's ESG classification, Category A[59] investments (pursuant to the Environmental and Social Risks Categories) are excluded from eligibility for financial support under this Programme.

- For Sub-Projects for Global Credit Program and consistent with IDB's ESG classification only ESS Category C low risk investments (equivalent to GCF Category C) will be eligible.

- The EE shall commit to only finance with resources from this Programme projects that, in addition to complying with the eligibility criteria previously described, comply with all pertinent regulatory requirements of each Host Country in environmental, social, health, safety and labor matters.

Pass-through of GCF concessionality:

Any Sub-project structured as a global credit program needs to ensure that final borrowers can benefit from the concessional terms provided by the GCF. To this effect, a methodology to ensure the transfer of this concessionality will be developed for each Sub-project during the preparation phase. Concretely, this methodology will ensure that final borrowers effectively benefit from the improved financing conditions –at least one of the terms previously mentioned (i.e., interest rate, tenor, amortization profile, grace period, etc.).

The preparation process of this customized methodology to transfer concessionality will consider local market conditions and the specific context of each Sub-project, so that the concessionality is used to effectively address the most relevant inadequacy of identified available financial terms in each local context. For instance, if the main obstacle is the level of interest rates, the financial solutions structured and the concessionality transfer approach (and thus the

[59] A project will be classified as Category "A" when it is likely to cause significant negative environmental and associated social and cultural impacts whether direct, indirect, regional or cumulative. This concept applies also to the operation's associated facility. Negative impacts are considered significant when: (i) they extend over a large geographic area; (ii) they are permanent or occur for an extended period of time; and (iii) they are of high intensity and/or high magnitude.

methodology to ensure it) will be focused at supporting access to lower interest rates; if the main challenge is instead related to tenor, the financing solutions and methodology will be focused at supporting access to longer tenors.

An indicative approach to a methodology[60] aimed at ensuring the transfer of concessionality through the enhancement of interest rates and/or tenor, as per the two scenarios exemplified, is presented below. This will be further tailored and expanded, as needed, during each Sub-project preparation process:

- To ensure end beneficiaries access concessional interest rates:
  - Each EE will offer an interest rate lower[61] than that associated to its existing financial products for similar loan recipients (which are themselves normally already more attractive than comparable products in the market in the case of NDBs); and
  - LFIs in Tier 2 operations will be required to declare (1) the average interest rates applied to their loan portfolio under similar tenors and with similar uses of funds, and (2) that the beneficiaries financed with GCF resources will be offered a final interest rate lower than said average. This aims to ensure that LFIs apply concessionality relative to similar existing financing lines.
- With regards to tenors, for EEs and LFIs the same logic applies but, in this case, declared information should be associated to existing average tenors in similar loan portfolios and requirements to provide longer tenors in GCF-funded loans.

The AE will require EEs to report how the concessionality would be passed onto the loan recipients (final borrowers) using the following criteria:

- For Tier 1 (direct) financing to loan recipients, the difference between EEs financing conditions (interest rate and/or tenor) and: a) financing conditions of GCF-funded loans after blending with co-financing, and b) financing conditions of loans without GCF resources.
- For Tier 2 (indirect) financing to loan recipients via LFIs, the difference between LFIs' financing conditions (interest rate and/or tenor) and: a) financing conditions of GCF-funded loans, and b) financing conditions of loans without the GCF resources.

Data on the described reports will be sourced from a combination of publicly available data, internal EEs data, and LFIs declarations, as applicable.

Given the above conditions, whenever final borrowers decide to take on a loan from a GCF-supported financing line, the concessionality provided will be deemed adequate. Adequate concessionality is driven by the decisions of the final beneficiary to act in favor or against taking an investment loan, as well as the lack of incentive for the loan provider to offer interest rates lower (or tenors shorter) than required by borrowers, which would go against its own financial interest and profitability. The above-described methodology aims to (i) reduce costs and subjectivity for all actors involved, (ii) provide a feasible and implementable application.

Each concessionality methodology will be incorporated in the Operating Regulations (OR) of the Sub-Projects. As such, compliance with the methodology by EEs will be part of the requirements for disbursements of Programme funds. In addition, the EE will have to report periodically and ex post on the application of the methodology of concessionality transfer and how it was ensured throughout a Sub-Project execution.

EVs are purchased instead of new conventional vehicles i.e., the old unit is at the end of its lifespan and not retired or phased out prior normal replacement. The intervention of the Program is that instead of a new fossil vehicle a new EV is purchased. What happens with the old vehicle is the same in the project case or in the baseline case. All emission impacts and financial calculations are a comparison of a new fossil against a new electric unit. The Program does not promote earlier replacement or scrapping of vehicles. Scrapping Programs in any case have limited merits as for example in the case of buses old municipal buses could still be used to replace even older rural or private transport

60 Subject to further validation and definition with each EE, at the time of sub-project preparation.

61 The objective of such lower interest rate is to induce the uptake of eligible investments under the FAA, and changes current behavior by all stakeholders involved. The lower interest rate or longer tenor thus needs to make a significant contribution to the cash-flow profile of the investments, to be deemed to provide financial additionality. NDBs' policy mandate is to provide long-term concessional finance and thereby to crowd-in private investments. NDBs' role is to address the lower risk appetite of LFIs by financing sectors with economic and societal benefits which currently do not attract LFI financing due to higher perception of risk for these types of activities. NDBs already utilizes longer than market tenors and concessional interest rates in its traditional operations. The GCF-financed line will allow NDBs to increase both its tenors as well as its concessional interest rate beyond its own existing financing conditions and extend that benefit to final-end beneficiaries.

buses with low mileage. The Program therefore does not change the number or age structure of vehicles but the vehicle technology. Instead of for example 100 new diesel buses (BAU) the Program will support 100 new electric buses. What happens with the old buses being replaced by new diesel or electric units is the same in the baseline as in the project case. Therefore: the Program does not add vehicles. In absence of the Program exactly the same amount of vehicles would be purchased, just fossil instead of electric units.

PRIORITY INVESTMENTS AND PROJECT PIPELINE

The indicative Sub-Project pipeline for the Program is given in the following table. For the first set of potential Sub-Projects (2022 to 2024), 10 Sub-Projects have been initially identified. The identified Sub-Projects include 'shovel-ready' projects with high likelihood of being financed by the Program in 2023.

Table 7: Indicative Pipeline Projects

Project	Investment	Status
V2G pilot project Barbados	5 MUSD	Pre-feasibility
V2G pilot project Jamaica	5 MUSD	Pre-feasibility
Electric vessel pilot project Cartagena, Colombia	11 MUSD	Pre-feasibility
Electric vessel pilot project Costa Rica	5 MSUD	Pre-feasibility
Pilot hydrogen project Chile	11 MUSD	Pre-feasibility
Pilot hydrogen project Uruguay	11 MUSD	Pre-feasibility
Pilot hydrogen project Paraguay	11 MUSD	Pre-feasibility
Integrated urban electric bus project Asuncion, Paraguay	28 MUSD	Pre-feasibility
Integrated urban electric bus project Manizales, Colombia	29 MUSD	Pre-feasibility
Integrated urban electric bus project Panama City	73 MUSD	Pre-feasibility

B.4. Implementation arrangements (max. 1500 words, approximately 3 pages plus diagrams)

Sub-Projects: Components 1, 2 and 3 will be implemented through a set of sub-projects approved by the AE in accordance with its internal policies and procedures that may consist of a single Activity or a set of Activities under the respective Components ("**Sub-Project**"). A Sub-Project can be financed by a single Financial Instrument or multiple Financial Instruments including, in the case of Sovereign Investment Loans, High Concessional Loan and/or Low Concessional Loans, as well as the Investment Grants. There can be more than one Sub-Project in a Host Country. Activities under Component 4 will be financed by Technical Cooperation Grants. For the avoidance of doubt, the Activities under Component 4 will not be included in a Sub-Project under Components 1, 2 and 3. The AE, will evaluate and select, the Sub-Projects that meet eligibility criteria set forth in Section B.3 of this Funding Proposal and the overall Program objective.

Host Countries. The Program will be implemented in Barbados, Chile, Colombia, Costa Rica, Dominican Republic, Jamaica, Panama, Paraguay, Uruguay (the **"Host Countries"**). For the avoidance of doubt, the Funded Activity will not finance activities or Sub-projects in countries other than these listed Host Countries. Inclusion of a new Host Country to the Funded Activity will constitute a Major Change.

GCF Proceeds and Financial Instruments. The total amount to be disbursed by the Fund to the AE under the FAA is up to USD 200,000,000 (Two hundred million United States Dollars) in the form of:

- USD 145,000,000 in the form of GCF Reimbursable Funds which the AE will use, as the trustee of the GCF Proceeds, to provide sovereign investment loans to finance ("**Sovereign Investment Loans**"):
  - USD 57,100,000 in the form of high concessional Sovereign Investment Loans for financing Activities under Component 1 and Component 2 ("**High Concessional Loans**"), related to the integration of urban infrastructure with climate resilient measures in countries targeted by the Program; and
  - USD 87,900,000 in the form of low concessional Sovereign Investment Loans financing Activities under Components 2 and 3 ("**Low Concessional Loans**") related to the integration of e-mobility with public transportation and non-motorized transportation sectors as well as to the deployment of EV fleets linked with innovative business models and supportive policies in countries targeted by the Program; and

- USD 55,000,000 in the form of GCF Non-Reimbursable Funds which the AE will use, as the trustee of the GCF Proceeds to provide:
  - USD 44,100,000 for investment grants to finance Activities 1.1.1 under Component 1, Activities 2.1.1 and 2.1.2 under Component 2, and Activities 3.1.1 and 3.2.3 under Component 3 ("**Investment Grants**");

- USD 9,934,200 for technical cooperation grants to finance Activities 4.1.1, 4.1.2, 4.1.3, 4.2.1, 4.2.2, 4.2.3 and monitoring and evaluation under Component 4 ("**Technical Cooperation Grants**"); and
- USD 965,800 for the project management costs,

together, (the "**GCF Proceeds**"). Sovereign Investment Loans, Investment Grants and Technical Cooperation Grants are collectively referred to as **Financial Instruments**. The AE Fee is not included in the GCF Proceeds.

Co-financing. The total amount of expected Co-financing for the Programme is estimated to be USD 250,000,000 subject to the approval of allocation of funds to each individual Sub-Project on case-by-case basis and contingent on such approvals being obtained and subject to the terms of the corresponding legal agreement(s), including the co-financing ratio set out in this Term Sheet to be provided by the following indicative co-financiers:

- an estimated amount of USD 200,000,000 by the AE, including IDB own resources and other resources administered by IDB; and

- an estimated amount of USD 50,000,000 by the Countries (the co-financing source under "Countries" is explained in the Budget, Annex 4).

"**Co-financing**" means jointly the amounts of estimated funding to be provided by the co-financiers, and separately, any of such co-financing (as detailed Annex 4).

1. Implementation Arrangements

1.1. Introduction

The GCF and the AE will enter into a Funding Activity Agreement (FAA) in the form of a trust agreement applicable to the GCF Trust Fund[62] based on the terms and conditions set out in the Term Sheet of the Program. As provided in the Accreditation Master Agreement (AMA), the FAA will establish the requirements for the transfer, administration and use of GCF Proceeds for the financing of the Program. The AE will be solely responsible for the management and administration of GCF Proceeds in accordance with its policies, procedures and practices, and following the provisions set forth in the AMA and the FAA. In this context, AE will provide management, monitoring and supervisory mechanisms to maintain a transparent and effective administration of the Program.

The IDB, in its capacity as the AE, will execute Subsidiary Agreements pursuant to the terms and conditions of the FAA, once the relevant Sub-Projects are approved by the IDB and for the implementation of Component 4 (except in some cases of Technical Cooperation Grants executed directly by the IDB, as explained below). The Subsidiary Agreement will establish the applicable framework and conditions for execution of each Sub-Project.

Selection and approval of Sub-Projects. Following a request from a specific Host Country to the AE, a Sub-Project will be prepared, assessed and approved as an individual IDB project financed with GCF Proceeds and Co-financing under this Program. Each Sub-Project shall be consistent with the objective, scope and activities of the Program as established in Section B.3 of this Funding Proposal and aligned with one or more of the expected results, as presented in the Program performance indicators in Section E.5 of this Funding Proposal. All Sub-Projects shall also be included in IDB programming and strategic dialogue with each Host Country, in the context of local government priorities and existing collaboration with the IDB.

The AE will carry out all appropriate due diligence on each Sub-Project, including all checks and assessments on the Borrowers and/or Grantees, and if applicable, EE identified for such Sub-Project, in a manner that it ordinarily would carry out in any project/program financed by the AE and in accordance with the AMA and FAA.

1.2 Contractual and Implementation Arrangements

1.2.1. Components 1, 2, and 3 of the Program

Sub-Projects under Components 1, 2, and 3 of the Program will be executed through EE. For the avoidance of doubt, the AE will not act as an EE of a Sub-Projects under Components 1, 2 and 3.

[62] The Trust Fund being referred to is the same established by the IDB for other Funded Activities.

For the financing and implementation of the Sub-Projects, the AE will enter into the following Subsidiary Agreements with the relevant borrower ("**Borrower**") and/or grantee ("**Grantee**"), as applicable:

- Sovereign Investment Loan Agreements for High Concessional Loan and/or for Low Concessional Loan, and/or
- Investment Grant Agreements.

For the avoidance of doubt, the Borrower and the Grantee are the EEs, unless otherwise specified below.

Guarantee Contract. The Borrower shall be an eligible borrower (either the Host Country or public entities of the Host Countries) under the AE policy. If the Host Country is not the Borrower of the Sovereign Investment Loan, in accordance with the AE policy, a Sovereign Guarantee will be provided by the Host Country under a Guarantee Contract under which the Host Country, as the guarantor, agrees to be jointly, severally and unconditionally responsible for the financial obligations contracted by the Borrower in the Sovereign Investment Loan Agreement with respect to the GCF Reimbursable Funds. For example, if the Borrower in a Sovereign Investment Loan is an autarchic public entity (i.e., an autonomous public company) or a subnational government (i.e., a municipality or state) or a national development bank in the Host Country, in addition to the Sovereign Investment Loans between the Borrower and the AE, the AE will enter into a Guarantee Contract with the Host Country.[63] It is understood that private sector entities will not be eligible to be a Borrower and/or Grantee.

EEs. In respect of each Sub-Project, it is expected that the Borrower and/or Grantee will be the EE for the Sub-Project. If the Borrower/Grantee is the Host Country, the Host Country may act through one its sovereign organs or agencies as an EE.

There may be circumstances where a Sub-Project needs to be carried out, in whole or in part, by an entity other than the Borrower/Grantee. In such a case, the AE and the Borrower/Grantee will jointly determine, and designate in the Subsidiary Agreement, the relevant third-party EE that will be responsible for the implementation of the Sub-Project. The Borrower/Grantee may enter into a project execution agreement with the EE ("**Execution Agreement**"). If the technical execution of the Sub-Project is to be carried out, in whole or in part, by a separate legal entity, the AE shall establish the following contractual arrangement in the following order of preference:

- **Option 1.** If permitted under the laws, rules and regulations applicable to the Borrower and/or Grantee and third-party EE, the third-party EE will also sign the Subsidiary Agreement(s) to confirm its capacity and to agree on its role as EE, and its obligations as such established therein. The AE will monitor and supervise that EE. This option will not preclude the existence of an additional Execution Agreement on terms and conditions approved by the AE.

- **Option 2.** If Option 1 is not feasible, the Subsidiary Agreement(s) set out above, shall cause the Borrower and/or Grantee to engage the third-party entity through an Execution Agreement. The Execution Agreement will require the third-party EE to execute the Sub-Project in accordance with the Subsidiary Agreement. The AE will be required to approve the Execution Agreement and no amendments may be made to the Execution Agreement without AE's prior written consent., Under this arrangement the AE will monitor and supervise the EE in order to perform its functions under the AMA and FAA, and the EE will report to the AE.

- **Option 3.** If the foregoing Options are not feasible, on a case-by-case basis in respect of the relevant Sub-Project the AE shall seek GCF's instructions on the implementation arrangement for that Sub-Project.

In any event, under the terms of the Subsidiary Agreement, the Borrower/Grantee will be accountable for all the actions and activities of the third-party EE. To this effect, the Subsidiary Agreement shall establish that all obligations of the Borrower/Grantee or the third-party EE, as the case may be, shall be fulfilled to the satisfaction of the AE. The Subsidiary Agreement will establish the remedies available to the AE in the event the Sub-Project is not executed as required therein.

The Sub-projects may be structured and implemented in the following manner:

A. Specific, pre-determined Sub-Projects [64] allow financing a specific project for specific purposes with interdependent components and activities which are wholly defined at the time of approval of the Sovereign Investment

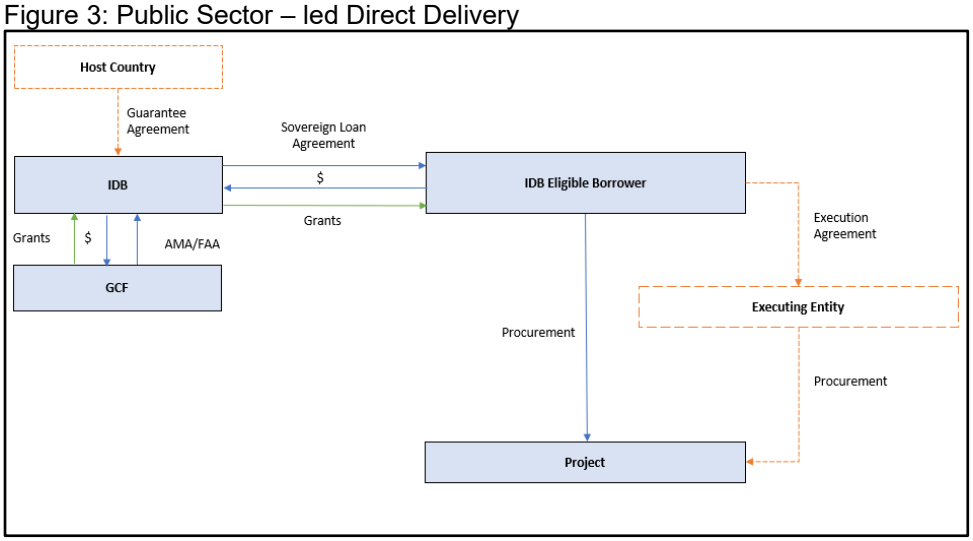
[63] Pursuant to IDB policy, this does not apply with regard to loans to development banks or agencies that have ample financial capacity to meet the obligations they would assume towards the Bank, provided that their charters include the provision that all the operations they enter into as borrowers are covered by a joint and several or subsidiary guarantee of the nation.

[64] Figures 3, 4, and 5 of the Funding Proposal present examples of possible financing structures that could be used in Sub-Projects funded with Sovereign Investment Loans for Specific Projects.

Loans. The Sub-Project cost, including Co-financing requirements, its preliminary design, and its technical, financial, and economic feasibility need to have been estimated, and due diligence has been carried out when the IDB approves the Sub-Project. This type of Sub-Projects may be implemented in three different ways:

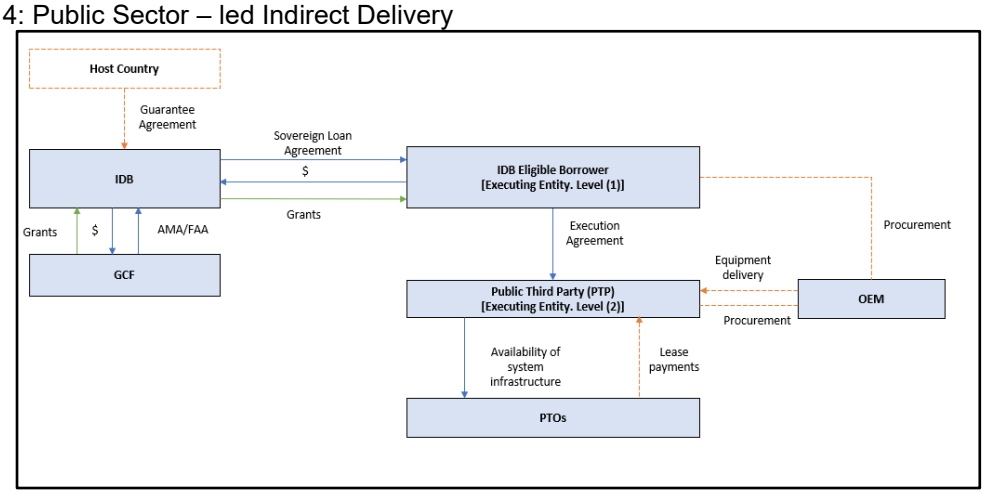
- **Option 1: Public Sector-led Direct Delivery:** The AE will enter into Subsidiary Agreement(s) with the Borrower/Grantee, under which it will provide the Borrower/Grantee with a Sovereign Investment Loan and/or an Investment Grant.

Figure 3: Public Sector – led Direct Delivery



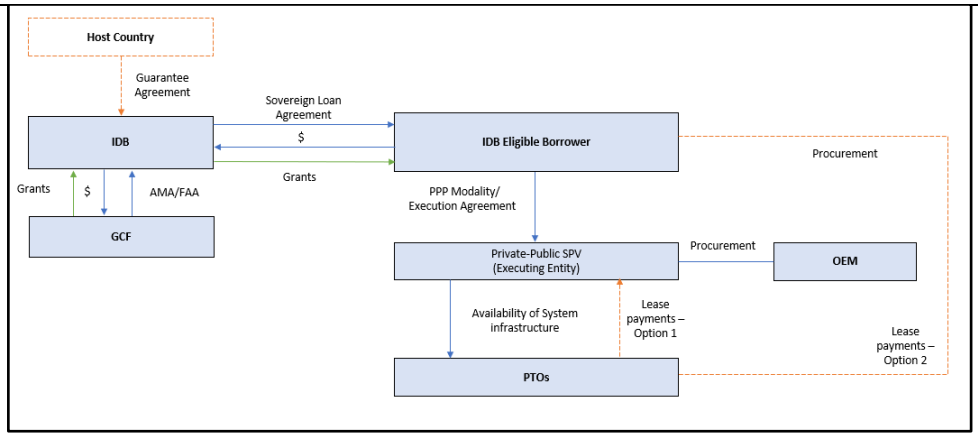
- **Option 2: Public Sector-led Indirect Delivery:** The AE will enter into Subsidiary Agreement(s) with the Borrower/Grantee under which it will provide the Borrower/Grantee with a Sovereign Investment Loan and/or potentially an Investment Grant. The Borrower/Grantee will then enter into an Execution Agreement with a further EE, which will be a public third party (the "**PTP EE**"). Both the Borrower/Grantee and/or the PTP EE could be EEs under this implementation modality. Where the Sub-Project requires that investments be made or procurement be undertaken, these tasks may be carried out by either the Borrower/Grantee or the PTP EE. The PTP EE will either (i) provide services to final beneficiaries directly or (ii) procure a public transport operator (a "**PTO**") under a procurement agreement to provide such services. As the PTO is procured and has no discretion, it shall not be an EE.

Figure 4: Public Sector – led Indirect Delivery



- **Option 3: Public-Private Sector-led Indirect Delivery:** The AE will enter into a Subsidiary Agreement with the Borrower/Grantee under which it will provide the Borrower with a Sovereign Investment Loan and/or an Investment Grant). The Borrower will then enter into an Execution Agreement with a public-private entity (the "**Public-Private SPV**"). The Public-Private SPV will then then be responsible for implementing the Sub-Project.

Figure 5: Public-Private Sector – led Indirect Delivery



B. Sub-Projects for Global Credit Programs allow financing multiple eligible investments through intermediary financial institutions or similar agencies (such as national development banks or "NDBs") in the Host Countries, which will act as the EEs. The sub-borrowers that receive the resources from the financial institutions or similar agencies will be the final beneficiaries ("Final Beneficiaries") of this kind of sub-projects. Funds will be passed on to Final Beneficiaries in the form that can provide terms (e.g., tenor, price, amortization profiles, collateral requirements) more adequate to finance individual investment projects of Final Beneficiaries.

To this effect, the IDB transfers the Sovereign Investment Loan and Co-Financing from IDB to the EEs in accordance with the terms of the Subsidiary Agreements. If applicable, Co-financing other than IDB Co-financing, as specified in each Sub-Project may be provided by the Host Country or the EE, or as otherwise specified in the relevant Subsidiary Agreement. Then, EEs will enter into funding agreements ("**Sub-Loan Agreements**") with eligible local financial institutions ("**LFIs**") and/or directly with Final Beneficiaries of private projects. Following the criteria established in the corresponding Subsidiary Agreement, the EE will approve the financing of investments to be funded under the Global Credit Program Sub-Project. The AE will develop detailed requirements and eligibility criteria to be applied to the Sub-Loans to be financed under the Global Credit Programs which will be passed down to the EE under the Subsidiary Agreement. The EE will be required to apply those requirements and criteria when selecting the Final Beneficiaries and Sub-Loans.

- **Option 1: Global Credit Programs via LFIs:** The AE will enter into a Subsidiary Agreement with the Borrower under which it will provide the Borrower with a Sovereign Investment Loan (and/or an Investment Grant). The LFI will then enter into a further Sub-Loan Agreement with the Final Beneficiary.

- **Option 2: Sovereign Investment Loans for Global Credit Programs without LFIs:** The AE will enter into a Subsidiary Agreement with the Borrower under which it will provide the Borrower with a Sovereign Investment Loan (and/or an Investment Grant). The Borrower will then enter into a Sub-Loan Agreement with the Final Beneficiaries.

The funding (in the form of loan) provided to the Final Beneficiaries either via LFIs or directly from the **Borrower** are referred to as **Sub-loans**.

C. Additional implementation arrangements for Components 1, 2 and 3

Subsidiary Agreements will contain provisions related to the financial terms and conditions, disbursements and use of resources, execution scheme of the Sub-Project, as well as to the supervision, monitoring, and evaluation of the Sub-Project, including the necessary provisions to comply with the corresponding requirements and/or obligations set forth, as applicable, in the AMA and FAA. In addition, Subsidiary Agreements will require compliance with IDB's policies and procedures, as specified in such agreements.

EEs will be responsible for the full execution of the Sub-Projects in accordance with the provisions of the Subsidiary Agreements and Execution Agreements, if applicable. Eligible EEs will be identified jointly with national governments based on the relevance of their public mandate to the Program activities, experience in finance structuring and fiduciary management, and track record, including with the IDB.

As per IDB policy, prior to the approval of each Sub-Project, IDB's fiduciary team will perform and/or update an institutional capacity assessment on the corresponding EEs in accordance with the information provided in Schedule

3.B. This assessment includes overall technical capacity, adequacy of information systems, internal and external controls, and recommendations on any fiduciary risks identified.

1.2.2 Component 4 of the Program

Activities under Component 4 of the Program will be financed through the Technical Cooperation Grants. Technical Cooperation Grants will be approved by the AE as a separate Technical Cooperation Sub-Project, which may be linked to Sub-Projects under Components 1 to 3. For the avoidance of doubt, the Technical Cooperation Grants will not finance or be a part of the Sub-Projects under Components 1, 2 and 3, but may support analytical work required for the preparation or execution of those Sub-Projects at the national and/or regional levels. The execution of Technical Cooperation under this Program will be done under the IDB's Technical Cooperation Policy, related operational guidelines and the Eligibility Criteria, if applicable. According to the IDB's Technical Cooperation Policy, IDB may be the EE for Technical Cooperation, and/or it may enter into Technical Cooperation Grant Agreements with another EE. Whether the EE would be the IDB, or a third party will depend on the specific Host Country context and beneficiaries' preferences and capacity. The IDB will determine along with Host Country and potential beneficiaries, the detailed deployment of specific Technical Cooperation Grants and define on the basis of it the best execution option. If the IDB is not the EE, the EE will be determined and assessed as part of the preparation of every Sub-Project to be designed under the Program.

- Third-party EE. EEs for Technical Cooperation activities must be legally established entities. This includes: (i) national and subnational institutions from borrowing member countries of the IDB with the legal capacity to enter into agreements with the IDB; (ii) regional and subregional agencies established by the same countries; (iii) private companies eligible to receive loans from the IDB; and (iv) not-for-profit institutions, including civil society associations. When the IDB is not the Executing Entity, IDB will enter into Technical Cooperation Agreements, which will be Subsidiary Agreements, with eligible EEs. In this case, EEs will be required to use applicable IDB's procurement policies for their use of GCF Proceeds and Co-financing.

  According to IDB procedures, a formal diagnosis of the EEs (similar to the one performed for EEs of Sovereign Investment Loans and Investment Grants) is required to assess legal and institutional capacity, fiduciary management, eventual execution risks and identify and implement mitigation measures.

- IDB execution. The IDB may execute Technical Cooperation activities depending, for example, on the local context or high technical complexity of the activities. The execution by the IDB would enhance the quality control of the studies and methodologies to be developed and would improve the efficiency and velocity in the design and execution at the Sub-Project level. When acting EEs, the IDB would apply its own policies and procedures for the hiring of individual consultants and/or procurement of consulting and other services, ensuring the fulfilment of applicable AMA and FAA requirements.

2. EEs of Approved Sub-Projects

Following the effectiveness of the FAA for this Program, GCF Proceeds and Co-financing would be allocated by the IDB in the context of Sub-Projects and multi-country Technical Cooperation Grants. The assessment of the institutional and legal capacity and eligibility of EEs will be individually undertaken as part of the preparation process for each Sub-Project conducted by IDB and will follow IDB policies, procedures, and due diligence standards. Only after a Sub-Project has been approved by IDB, may IDB enter into any Subsidiary Agreement with the relevant EE. IDB will inform the GCF prior to the disbursement by GCF to IDB for a specific Sub-Project, the contractual arrangement and structural options applied to such Sub-Project.

As per IDB policies and procedures, prior to the approval of each specific project, IDB's fiduciary team will perform and/or update an institutional capacity assessment on the corresponding EE. This assessment includes overall technical capacity, adequacy of information systems, internal and external controls, and recommendations on any fiduciary risks identified.

In the case of Technical Cooperation executed by EEs, four basic areas are evaluated: (i) Management of Contracting of Services and Procurement of Goods; (ii) Administrative, Financial and Accounting Management; (iii) Technical and Monitoring Capacity; and (iv) Knowledge Management and Strategic Communication Capacity. It should be noted that this analysis is comprehensive as it also identifies institutional characteristics and capacities associated with the management of resources from national and international donors, good practices, experience, and use of systems to strengthen these, with a view to efficient and transparent project execution.

An indicative list of already identified EEs, especially for the execution of Financial Instruments (Sovereign Investment Loans and Investment Grants):

Host Country	Indicative EEs
Barbados	• Ministry of Energy, Small Business and Entrepreneurship • Ministry of Transport, Works and Water Resources
Chile	• Ministerio de Energía • Ministerio de Transportes y Telecomunicaciones • Ministerio de Economía a través de Corporación de Fomento a la Producción (CORFO)
Colombia	• BANCOLDEX • FINDETER • Ministerio de Energía y Minas
Costa Rica	• Instituto Costarricense de Electricidad • Ministerio de Medio Ambiente y Energía • Ministerio de Obras Públicas y Transportes
Dominican Republic	• Corporación Dominicana de Empresas Eléctricas Estatales • Oficina Metropolitana de Servicios de Autobuses (OMSA) • Banreservas
Jamaica	• Ministry of Science Energy and Technology • Jamaican Urban Transit Corporation (JUTC) • Jamaica Transport Authority
Panama	• Secretaría de Energía • MiBus – Autoridad de Tránsito y Transporte Terrestre
Paraguay	• Ministerio de Obras Públicas y Comunicaciones • Viceministerio de Minas y Energía • Viceministerio de Transporte • Administración Nacional de Electricidad
Uruguay	• La Administración Nacional de Usinas y Trasmisiones Eléctricas (UTE) • Ministerio de Industria, Energía y Minería. • Intendencia de Montevideo

B.5. Justification for GCF funding request (max. 1000 words, approximately 2 pages)

Rationale for and Additionality of GCF Funding

The Program introduces a concessional financing mechanism that addresses barriers to the uptake of commercial EVs, supports a transformative shift to low carbon transportation and increase climate resilience of urban transport infrastructure and the grid. Currently fossil vehicles dominate the market. Except in Santiago de Chile and Bogota no large fleets of commercial EVs operate. In Chile the Program will not finance e-buses and in Colombia only in intermediate cities without mass transit system. The paradigm shift towards electric mobility not only entails new vehicles but a new fueling/charging infrastructure, changes in vehicle maintenance and operations and frequently also requires changes in the business model and reduce vulnerabilities of the urban transport infrastructure. Actors in the commercial vehicle sector fear such disruptive changes as it can affect their core business. Government on the other hand are keen on promoting e-mobility as this can reduce emissions and dependance on fossil fuels whilst also creating long-term sustainable jobs. They therefore often state political targets or objectives to promote e-mobility coupled with stand-alone EV pilots. The missing link is however to kick-start EV massification with a first batch of at-scale implementation projects. Such initiatives are dependent on concessional funding to make them financially and from a risk perspective feasible. These projects are also the base for meaningful, practical, realistic and action-oriented roadmaps and for developing policies which are cost-effective and reduce actual barriers towards e-mobility. Stand-alone pilots or technical assistance has proven to be to theoretical and insufficient to kick-start mass deployment of EVs. GCF concessional financing is critical to ensure this comprehensive e-mobility approach – in absence of concessional GCF finance, such projects will not materialize in the short or medium term. Also, IDB links the e-mobility

projects with sustainable urban mobility components and with investments to improve the resilience of urban transport infrastructure as well as measures to increase the grid resilience. GCF concessional financing is critical to strengthen the capacities cities have to identify climate risks and formulate adaptation measures. Also, GCF concessional financing is imperative to finance prioritize measures to reduce vulnerability to such risks and build resilience for an optimal and safe operation of e-mobility.

The e-mobility report (Annex 2a) clearly shows that all countries with large fleets of commercial EVs (>100 units) have used, at least initially, financial support instruments to kick-start mass EV deployment. The experience of countries is however also that once a large fleet is established subsidies can be reduced gradually and even be eliminated with 5-10 years due to more competitive prices of EVs combined with the experience of mass operations of such vehicles. Also, the magnitude of subsidies can be reduced with adequate policies and regulations (e.g. concession periods for buses) and business models per vehicle sector. Concessional finance from the GCF is not required in replication projects which happen at a later stage as:

- EV market prices decrease: EV prices are decreasing in all vehicle segments due to decreasing battery prices and increasing competition and supply of EVs. TCO parity with fossil vehicles is expected in the targeted vehicle categories between 2025 and 2030 and price tags of EVs will get close to fossil models by 2030. TCO alone will in many cases however not be a sufficient argument to move for EVs if the upfront incremental investment is still significantly higher and the risks are still perceived to be higher. However, decreasing vehicle costs are a very important ingredient to make EVs commercially viable without need for subsidies and further financial assistance.
- Reduced risks and costs for 2nd and 3rd projects due to showcasing of successful implementation projects and business models. Risks which are reduced by large fleet applications are (i) vehicle reliability and vehicle performance risks; (ii) improved information and therefore lower risk on assessing the re-sale value of used EVs important for introducing business models based on leasing; (iii) less risk concerning maintenance & repair capabilities and availability of spare parts including secondary spare parts markets; (iv) reduced risk on the workability of new business models in practice. The Program assists in this process by designing and implementing business models and by enabling with concessional finance the uptake of large fleets which are critical to reduce these risks.
- Policies which are more conducive for e-mobility and restrict fossil vehicle usage. This allows EVs to be more competitive. Lower costs, reduced risks, and improved framework conditions all create favorable conditions for investors to pour capital into this market as profit rates improve and risks get down. This will allow for widespread replication based on commercial terms in 5-10 years if the country has already gained experience with initial fleet deployment.

GCF concessional finance is critical to close the gap between fossil and electric vehicle technologies and to deliver a Program which realizes investments combined with TA. Guarantees do not resolve the barriers of EVs of lack of profitability and performance risks. Potential investors as well as FIs interviewed were only interested in guarantees if these incur no cost and if guarantee levels are very high (100%).

The major financial barriers for the potential beneficiaries which prevent alternative financing options are (i) the low financial profitability of EV investments reflected in a low FIRR and very long payback times (ii) the high risk profile of EV investments due to performance risks, asset risks (e.g., re-sale value of assets), and replacement investments (batteries) and (iii) high capital and investor's capital demand resulting in high debt and risk exposure levels of the investing entity. Commercial funding is thus not willing to enter this market. Alternative funding vehicles with a higher risk appetite are potentially interested but are critical of the lack of profitability and/or the high-risk profile. A good example for this case is Chile where traditional banks were reluctant to finance commercial EVs and private electric utilities entered the market with a leasing scheme for buses thus creating a new business approach (see Annex 2a). However, also these entities were only willing to kick-start the process when the government recognized and paid for the incremental investment cost of e-buses plus guaranteed payment of the leasing fees i.e., without concessional finance and risk mitigation instruments the deal would not have taken place.

Conventional financial institutions are also not willing to enter the market due to the novelty of the technology. The establishment of new technologies and new business models also entails significant additional transaction costs. Concessional GCF finance including grants can provide for technical assistance to design and structure in an optimal manner e-mobility investments and reduce design and performance risks whilst the financial instruments reduce risk exposure and increase profitability of the investment.

For pilot projects including electric vessels, hydrogen and V2G the current status is still at the learning curve. Pilot projects which have a potential to be replicated on a broad scale and which already have integrated a business plan for commercial mass deployment are supported. V2G and hydrogen projects also have the potential to increase the grid resilience through energy storage.

The multi-country approach is critical for a transformative and accelerated shift towards e-mobility which is again required to achieve the target of limiting the global temperature increase to below 2 degrees Celsius. The Paris Declaration on Electro-Mobility calls for the deployment of electric vehicles (EVs) compatible with a 20% share of all road transport vehicles in 2030 idem to 35% of vehicle sales in 2030. A multi-country programmatic approach is necessary given the scale of climate change challenges facing countries and the critical need to deliver transformative change at scale as quickly as positive as vehicle replacement rates are low thus resulting in long lock-in times of investments. Multi-country approaches are critical for learning and experience exchange between Latin American countries with activities such as the realization of different knowledge materials including publications, webinars, benchmark and best-practice studies, preparation of capacity building guidelines and outreach events including trainings and workshops. Through participation of various countries with a similar context the learning effect can be much larger. If the program is limited to one country, the replication will be basically on a national level. National programs are important but experiences from other countries can be brought in much easier if the Program covers multiple countries. The GCF involvement is critical to support low-carbon transport investments across multiple countries and vehicle sectors. With a multi-country programmatic approach resources can be used efficiently to highest priority investment projects – this cannot be achieved with a piecemeal, project-by-project approach. Individual projects are in most cases too small to warrant a Funding Proposal to the GCF with all transaction costs involved. IDB would thus refrain from financing electric mobility in most cases and not integrate it into its transport investments. The Program can also capitalize on synergies and lessons learned across countries and vehicle sectors and can effectively ensure transfer of knowledge and capacity building between stakeholders.

GCF assistance enables linking finance with technical and policy assistance. Investments alone are insufficient to achieve the transformation in climate action needed by the transport sector. Strategic sectoral planning and policy reform are critical aspects to enable the transformation towards electric mobility. The GCF, with the goal of supporting paradigm shifts in climate action, is critical for sufficient funding of the policy and technical assistance component of the Program.

Concessionality of GCF Funding

The Program will benefit from technical assistance that will be made available to accompany each project and will ultimately serve to enhance the viability of the projects. TA will also support the development of e-mobility roadmaps for commercial vehicles, charging infrastructure and a H2 economy, which is essential to achieve the Program's targeted trajectory change. TA related to knowledge generation and dissemination will ensure an enabling environment for the Program.

Projects involved in the proposed Program will not be dependent on a continuous flow of GCF funds. Rather, the Program aims to achieve substantial reduction in the need for concessional financing in future projects. It is expected that, over the course of implementation of the Program, e-mobility will gradually move towards commercial viability in countries which have kick-started the process. The use of GCF funds de-risks similar future investments and demonstrates the viability of e-mobility investments on commercial terms.

This Program is critical to reduce the cost of capital to offset partially incremental costs and mitigate the risks from initiating climate investments in a new technology. GCF's ability to offer concessional terms in investments enables prospective clients to invest in e-mobility which would otherwise not be able to do with IDB finance alone. The e-mobility report in Annex 2a clearly shows that all countries with large fleets of commercial EVs (>100 units) have used, at least initially, financial support instruments basically in the form of grants to kick-start mass EV deployment. Incremental investment costs of e-buses were grant financed by countries by 80-100%, e-taxis have been subsidized on average by 50% of their incremental investment cost plus subsidizing the establishment of dedicated urban fast-charging infrastructure and light commercial vehicles (LCVs) have received as subsidy 75-100% of the incremental investment cost. These subsidies come next to other benefits such as e.g., preferred urban access for electric LCVs or purchase tax incentives. The magnitude of subsidies can be reduced with adequate policies and regulations (e.g., concession periods) and business models per vehicle sector. GCF concessional finance combined with national support is critical

for sustainable market uptake linking initial pilot projects with commercial EV viability by inserting the missing part of initial large-scale fleets combined with business models, policy advice and technical designs which reduce risks related.

Technical cooperation assistance is used as support for the investment components and for policy and knowledge management to ensure a transformational impact. TA is used in the following areas:

- Project sourcing and preparation: The Program will provide direct TA to projects that will potentially receive later financial assistance. TA can include pre- and full feasibility assessment, legal, institutional, financial and technical advisory as well as advisory on possible business models and financial structuring. TA packages will support the local governments in the planning of EV routes and charging infrastructures, and include concept design, technology selection, charging strategy, operation and maintenance plan and battery handling and disposal strategy. This also includes the optimal design of e-mobility ecosystems including charging networks and the interface between vehicle, charging, and the grid. It also includes the identification and design of adaptation measures to increase the resilience of urban infrastructure.
- Capacity building, training and monitoring: TA is used to ensure delivery of adequate training from equipment suppliers or third parties for EV and charger operations and maintenance, safety trainings and capacity building in optimal management of EV fleets. This activity also includes performance monitoring of electric vehicles in technical and financial terms. In capacity building the emphasis will be on battery handling, re-usage, re-cycling and disposal.
- Support of enabling public policies for EV deployment: Technical support will be provided to the relevant national and local authorities in the countries and cities where the Program will support investments in order to set-up, improve and/or enforce enabling public policies and legal, regulatory, fiscal and/or normative frameworks for e-mobility and a hydrogen economy. The Program intends to establish in all countries where not yet available roadmaps for electrification of public transport, roadmaps for public charging infrastructure and in countries with potential roadmaps for hydrogen usage in transportation. Sectoral and specific roadmaps are a tool to steer climate investments and initiatives beyond the Program's scope and will help to inform and/or further detail the countries long term mobility strategies and their NDCs.
- Development and advisory services on optimal business models and financial structuring which relate to the peculiarities of EVs. This is targeted for PT to identify business models, models which allow for increased influx of private capital and which lower financing costs and risks for operators, leasing models, inclusion of electric utilities etc.
- Advisory services in the linkage of e-mobility with increased grid resilience via usage of 2nd hand batteries, hydrogen storage and V2G.
- Advisory services around increased resilience of urban infrastructure, the identification of potential measures, analysis of their cost-effectiveness and outreach activities on successful interventions.
- Inclusion of gender aspects in all projects to be financed as well as on a national and regional level.

Support for development of human capital in the transition to e-mobility through solutions, such as studies, standards, train the trainers, online courses, etc.) available to member countries by the RSCSE. Knowledge management strategy and regional outreach: The Program will develop knowledge products and share experiences and cases through channels such as webinar, electronic reports, case-studies, and workshops to disseminate experiences and build a base for replication. The Program will not create own platforms or channels for information dissemination but use existing channels.

B.6. Exit strategy (max. 500 words, approximately 1 page)

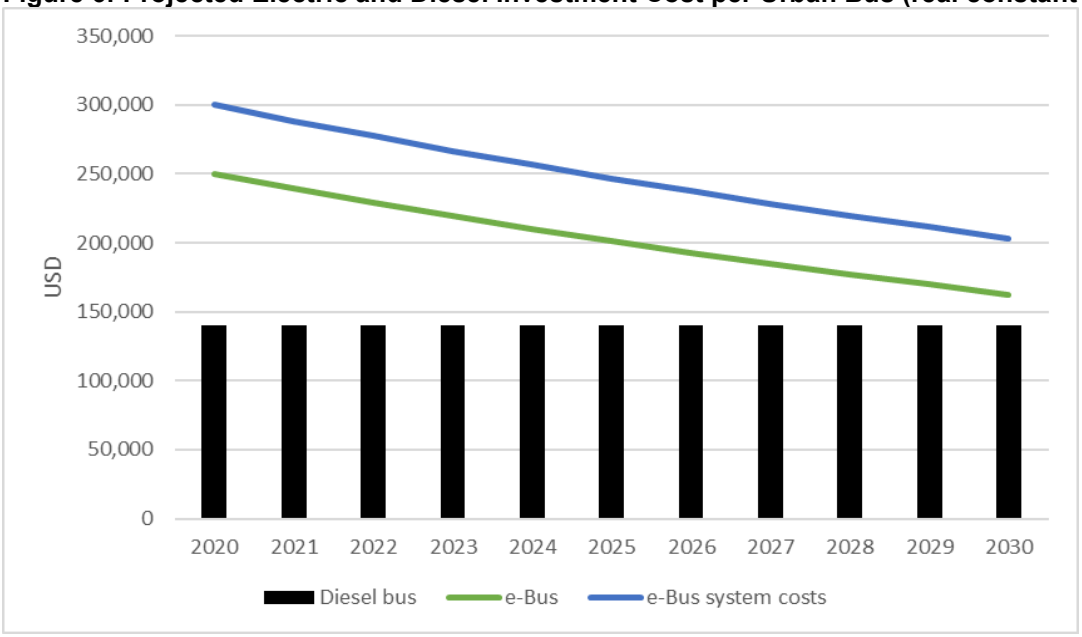
Exit Strategy

Repayments under concessional loans provided with GCF funds under the Program will be managed through the IDB-GCF Special Fund in accordance with repayment schedules set forth in IDB's loan agreement. All loans will be monitored by IDB. GCF resources will be reflowed back to the GCF in accordance with the terms of the FAA. The individual funded projects continue for their lifespan. Operational costs are lower for electric mobility investments than for conventional units – thus once the system is established all operators will continue using the assets.

Program Sustainability

It is expected that by 2030 commercial EVs as targeted by the Program are fully commercial viable and more attractive financially than fossil units. This is accelerated with the Program which provides for kick-starting the process thereby reducing performance risks for followers, establishing adequate business models and creating an enabling framework for further investments in e-mobility. The main Program impact is to initiate this process much earlier than under BAU. However, the Program sustainability is given through the market development of EVs going towards a commercially attractive product and through the Program activities which act as accelerator of this process. The trend of e-bus system investment costs relative to diesel units is shown in the graph. Whilst the investment cost is still expected to be higher for an e-bus system the significantly lower OPEX (basically energy plus maintenance cost) make the TCOs significantly lower than for fossil bus systems (in many countries the TCOs are already today lower but not sufficient i.e. the payback period is still long and sometimes longer than the concession period of PT operators thus not making the investment financially attractive under a risk viewpoint).

Figure 6: Projected Electric and Diesel Investment Cost per Urban Bus (real constant USD of 2020)



Source: Grutter Consulting

It is expected that by 2030 e-buses will be close to sticker price parity with diesel units, whilst total system costs per e-bus are still expected to be around 40-50% higher than of a fossil unit. However, the significantly lower OPEX of e-buses together with the technology and market maturity will make purchases of e-bus the standard, without necessity of further concessional finance. TCO costs will be significantly lower and payback periods of incremental e-bus investments under this investment price trend will be less than 5 years. This commercial uptake will only be realized if the investment risks of e-buses are reduced. This is possible through the establishment of new business models and through operations of initial large fleets which allow for performance monitoring thereby reducing uncertainty for follow-investors.

Similar trends of cost projections exist for other vehicle categories. For taxis/passenger cars and light commercial vehicles sticker price parity is expected by 2030[65]. This does not include the cost of public charging infrastructure which is not borne by the vehicle purchaser (except home chargers which are low cost) but are paid through usage fees of the public charging infrastructure. For trucks, FCEVs and vessels investment cost parity (only for the vehicle, excluding charging infrastructure) is expected some years later.

At the sectoral level the Program will deliver road maps for electric mobility in public transport and for public charging infrastructure. The roadmaps guide policymakers in creating a long-term enabling policy environment conducive towards increased investments in e-mobility. On a regional level the knowledge products and outreach events assist other countries in also implementing e-mobility projects and contributes towards the creation of a non-reversible dynamic towards electrification of the transport sector.

[65] See Electric vehicle trends | Deloitte Insights, (McKinsey, 2019), (UBS, 2021) or (MJB&A, 2021)

C. FINANCING INFORMATION

C.1. Total financing

(a) Requested GCF funding (i + ii + iii + iv + v + vi + vii)	Total amount	Currency
	200	million USD ($)

GCF financial instrument	Amount	Tenor	Grace period	Pricing
(i) Senior loans Mitigation	88	20 years	5 years	0.75 %
(ii) Senior Loans Adaptation	57	40 years	10 years	0.0%
(iii) Equity	Enter amount			
(iv) Guarantees	Enter amount			
(v) Reimbursable grants	Enter amount			
(vi) Grants	55			
(vii) Results-based payments	Enter amount			

(b) Co-financing information	Total amount	Currency
	250	million USD ($)

Name of institution	Financial instrument	Amount	Currency	Tenor & grace	Pricing	Seniority
IDB[66]	Senior Loans	195	million USD ($)	Up to 25 years 5.5 years[67]	SOFR based[68]	Options
IDB	Grant	5	million USD ($)			Options
National[69]	In kind Equity	50	million USD ($)			Options
Click here to enter text.	Options	Enter amount	Options	Enter years Enter years	Enter%	Options

[66] IDB financing may include IDB's own resources or other funds administered by IDB (different from GCF resources). IDB loans financed with its own resources have flexible terms. Financial terms subject to agreements with each borrowers and updated IDB terms. The estimated total amounts of IDB and other co-financiers are subject to the approval of allocation of such funds for each individual Sub-Project on a case-by-case basis and is contingent on such approvals being obtained and subject to the terms of the corresponding legal agreement(s).

[67] Under IDB FFF Investment Loans standard financial terms, the grace period is flexible as long as the Original Weighted Average Life (WAL) and Maturity Date does not exceed the limitations approved by the Bank; Maximum Tenor; 25 years, Maximum Wal:15.25 years.

[68] SOFR-Based interest rate comprised of: SOFR + IDB Funding Margin + Variable OC Margin. The IDB's Lending Rate is composed of 3 components, 1. SOFR rate applicable to the specific billing period, 2. IDB's funding Margin, average bank's cost to issue its debt (computed on a quarterly basis), which is expressed as a spread over SOFR and 3. IDB's Lending Margin. IDB publishes its Lending rate once a quarter, with the transition to SOFR, the periodicity of the calculation remains the same.

[69] Regarding the national contribution, the distribution between in kind and equity might change at the time of the design of sub-projects. It will vary for each sub-project and could include different options: in-kind national contributions, grant, and lending from other national sources such as National Development Banks.

(c) Total financing (c) = (a)+(b)	Amount	Currency
	450	million USD ($)
(d) Other financing arrangements and contributions (max. 250 words, approximately 0.5 page)	National finance may include grant, tax exemptions, and other in-kind contributions depending on country circumstances.	

C.2. Financing by component

Component	Output	Indicative cost million USD ($)	GCF financing		Co-financing		
			Amount million USD ($)	Financial Instrument	Amount million USD ($)	Financial Instrument	Name of Institutions
Component 1: Increase climate resilience of urban transport infrastructure	1.1 Fewer urban infrastructure damaged resulting from climatic shocks because of higher investments in vulnerability reduction 1.2 Fewer days to restore the IEUTS public transport service after climate shocks due to investment in climate resilience	97	54	Senior loans	27	Senior loans	IDB
			17	Grants	0		
Component 2: Test the potential of H2 storage and V2G to increase the grid resilience	2.1. H2 and V2G pilots are used to assess their viability of mass deployment to improve grid stability Click here to enter text.	53	18	Senior loans	10	Senior loans	IDB
			14	Grants	11	Grants	National co-finance
Component 3: Electrified integrated urban mobility	3.1. E-mobility is integrated with PT & NMT	105	12	Senior loans	62	Senior loans	IDB
			12	Grants	19	Grants	National co-finance

	measures to foster mode shift to low carbon transport						
	3.2. EV fleets are deployed with innovative business models to enable their mass applicatio	180	61	Senior loans	96	Senior loans	IDB
			2	Grants	20	Grants	National co-finance
Component 4: Technical assistance	4.1. A climate resilient e-mobility ecosystem integrated with urban transport is established to enable uptake of e-mobility	8	5	grants	3	grants	IDB
	4.2 Strengthened institutional and regulatory systems for climate-responsive planning and development	4	3	grants	1	grants	IDB
	Monitoring and Evaluation	1	1	grants	0	grants	IDB
	PMC	2	1	grants	1	grants	IDB
Indicative total cost (MUSD)		450	200		250		

C.3 Capacity building and technology development/transfer (max. 250 words, approximately 0.5 page)

C.3.1 Does GCF funding finance capacity building activities?	Yes ☒ No ☐
C.3.2. Does GCF funding finance technology development/transfer?	Yes ☒ No ☐

Capacity Building

Capacity Building is delivered under Component 4. This includes specifically:

- Capacity building and technical resources for training of operators, safety staff, maintenance staff etc. Technical assistance is used to ensure delivery of adequate training from equipment suppliers or third parties for EV and charger operations and maintenance, safety trainings and capacity building in optimal management of EV fleets. This activity also includes performance monitoring of electric vehicles in technical (energy usage, emissions) and financial terms (operational expenditures, vehicle availability rates);
- Support of national enabling policies for EV deployment, advice on battery re-usage, recycling and disposal and capacity building at a national level. Capacity building in the elaboration of sectoral roadmaps (electrification of public transport, electrification of taxi and ride hailing services; electrification of urban delivery services, electrification of long-haul freight and passenger transport,

electrification of the rail system, electrification of mobile machinery, electrification of vessels, hydrogen economy), and in the design and implementation of national policies which enable EVs. This includes also policies which affect directly the investment components of the Program such as concession contracts and structuring of public transport;

- Capacity Building on the design and implementation of measures to increase urban transport infrastructure and grid climate resilience. This includes the identification and assessment of cost-effective measures to increase the resilience of cities in transport infrastructure linked with e-mobility development and on measures to increase grid resilience through projects in the e-mobility field such as V2G, hydrogen energy storage or usage of 2nd hand EV batteries.
- Learning and experience exchange between countries with activities such as the realization of different knowledge materials including publications, webinars, benchmark and best-practice studies, and outreach events included in a learning and Knowledge Management Strategy (KMS).
- Capacity building for the development of human capital through the RSCSE solutions, such as studies, labor market intelligence, labor and training standards, train of the trainer's packages, learning resources and online courses.

Technology Transfer

Technology Transfer is facilitated through identification and design of appropriate e-mobility technologies and projects (technical design under Component 4) and their subsequent funding under Components 1 to 3.

D. EXPECTED PERFORMANCE AGAINST INVESTMENT CRITERIA

D.1. Impact potential (max. 500 words, approximately 1 page)

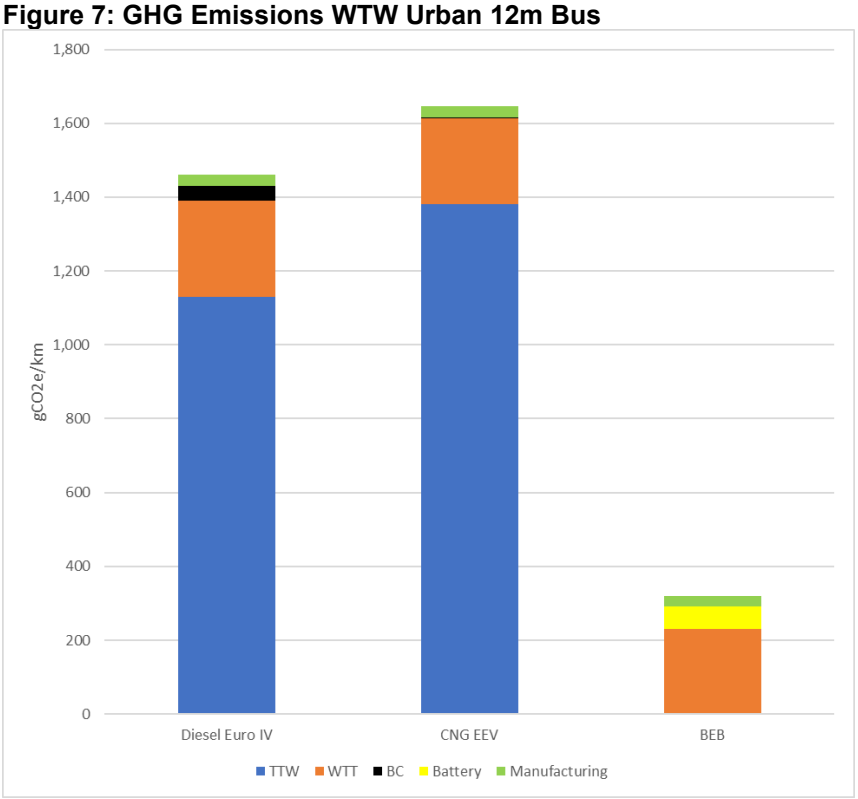
GHG emission calculations have been made per project type and were then expanded to the entire Program based on the expected number of projects and vehicles per project type. GHG impacts included are well-to-wheel i.e. include upstream electricity generation related emissions as well as transmission and distribution losses of the grid. Areas of emission reductions are (i) impact of replacing fossil with electric vehicles (BEV or FCEV), and (ii) impact of increased PT ridership due to PT system improvements (iii) cycle lanes and increased usage of NMT and (electric) micro-mobility impact. Details can be found in Annex 22 and the project reports in Annex 2.

Impact of EVs

The GHG reduction is due to operation of EVs procured with investments of the Program. The methodology used to determine emission reductions of EVs is based on the UNFCCC methodology AMS.III.C[70]. The GHG impact is determined based on a well-to-wheel (WTW) approach including carbon emissions from electricity production including transmission and distribution losses.

The comparison base are always new fossil vehicles and not the currently circulating units as the baseline case is that the operator would purchase a new fossil vehicle but with the Program purchases a new electric unit. Emissions of the old unit (if latter continues to operate) are the same in the baseline as in the project case and therefore not accounted for. The following graph shows GHG reductions on average for the included countries based on the median grid factor of Program countries for different vehicle categories.

Figure 7: GHG Emissions WTW Urban 12m Bus



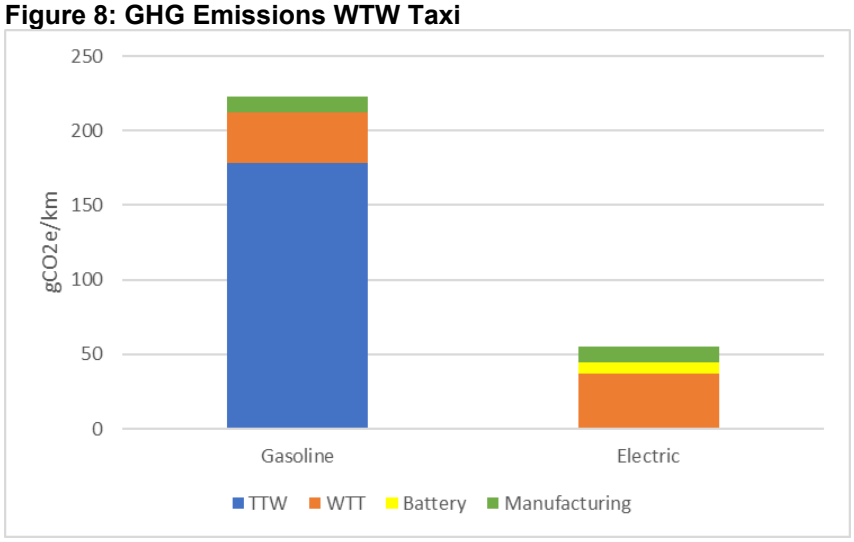
Note: TTW = tank to wheel; WTW = well to wheel; median carbon grid factor of Program countries (0.230 $kgCO_{2e}/kWh$); Source: Annex 22

On average over all Program countries BEBs have 80% lower WTW emissions than diesel units. Inclusion of upstream emissions (vehicle manufacturing including batteries) only changes the picture marginally. Even in the country with the

[70] untitled (unfccc.int)

highest carbon grid factor (Jamaica, grid factor of 0.498 kg CO_{2e}/kWh) included in the program BEBs still reduce GHG emissions by 60%.

Figure 8: GHG Emissions WTW Taxi

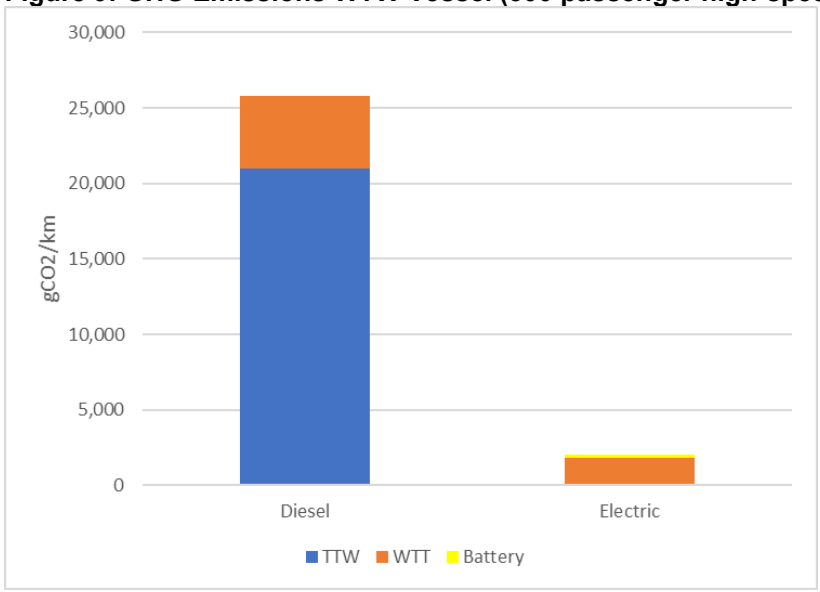


Note: TTW = tank to wheel; WTW = well to wheel; median carbon grid factor of Program countries (0.230 kgCO_{2e}/kWh);
Source: Annex 22

On average over all Program countries electric taxis have 80% lower WTW emissions than gasoline units. Inclusion of upstream emissions (vehicle manufacturing including batteries) only changes the picture marginally. Even in the country with the highest carbon grid factor (Jamaica, grid factor of 0.498 kg CO_{2e}/kWh) included in the program e-taxis still reduce GHG emissions by 60%[71].

Only green H2 projects will be supported with 100% renewable electricity being used. In these cases the hydrogen trucks reduce 100% of GHG emissions compared to a diesel unit (this is a project eligibility criteria; see section B3).

Figure 9: GHG Emissions WTW Vessel (300 passenger high-speed ferry)



Note: TTW = tank to wheel; WTW = well to wheel; median carbon grid factor of Program countries (0.230 kgCO_{2e}/kWh);
300 passenger high-speed vessel with data of Bangkok vessels of Energy Absolute
Source: Annex 22

On average over all Program countries electric vessels have 90% lower WTW emissions than fossil units. Inclusion of battery manufacturing emissions only changes the picture marginally. Even in the country with the highest carbon grid

[71] Values of institutional fleets are comparable

factor (Jamaica, grid factor of 0.498 kg CO_{2e}/kWh) included in the program electric vessels still reduce GHG emissions by more than 70%.

The following table shows the annual and lifetime average GHG reduction per vehicle unit.

Table 8: GHG Reduction per Vehicle (average figures for Program countries in tons CO_{2e})

Vehicle type	Annual average GHG reduction	Vehicle lifetime GHG reduction
Urban bus (12m)	87	1,391
Taxi	12	142
40t truck[72]	158	3,156
300 passenger vessel	1,344	26,884

Source: Grutter Consulting; see above and Annex 22b

Impact of PT Measures

The methodological approach to determine the impact of improved PT measures including system improvements as well as last-mile connectivity measures is based on the approved CDM methodology ACM0016 which allows to estimate the impact caused through mode switch from private means of transport to PT. Estimations of the incremental patronage of PT systems is thereby based on monitored results of already implemented projects. Measures which increase the PT usage include infrastructure investments in bus lanes and bus stations, smart ticketing, improved connectivity and intermodality, modern electric bus fleets and preference for PT systems in urban settings. The emission factor of private means of transport is per passenger-kilometer factor 4-5x lower than for PT in Latin American cities (see Annex 22). The assumed lifetime of measures is 20 years in accordance with infrastructure lifespan.

Impact of NMT Measures

The methodological approach to determine the GHG impact of cycling lanes established in the urban development measures of projects is based on a Global Environment Facility approach (GEF, 2015) based on (i) km of cycle-lanes (ii) number of additional cycling trips (iii) trip length (iv) baseline mode (iv) emission factors of baseline modes. GEF default values are used for projections. This results 270 tCO_2 of annual GHG emission reductions per kilometer of grade-separated cycle lane. Assuming a lifespan of cycle lane measures of 30 years the GHG lifespan reduction per km of cycle lane is estimated at 8,089 tCO_2 (see Annex 22b)

Accelerated Market Uptake of EVs due to the Program

The Program creates the conditions for an accelerated uptake of EVs due to reducing risk factors for investors thereby reducing the required level of FIRR to switch from a fossil to an electric vehicle. The Program implements interventions to kick-start EV mass deployment significantly earlier than under a Business as Usual (BAU) scenario by reducing the risk profile of investments and by comprehensive technical assistance. The key strategic value of the Program is that it functions as market accelerator enabling a far faster uptake of e-mobility than under a BAU scenario avoiding a lock-in of long-lived assets in fossil technology. The Program influences core parameters which determine the risk premium e.g. the performance uncertainty and operational costs of electric buses.

Impact of Adaptation Interventions

The Program aims to build resilience for the IEUTS to ensure cities have resilient transport to face climate hazards and potential emergencies in extreme weather events. Measures to reduce vulnerability to climate risks aim to minimize the interruption of service and maintain the level of safety, frequency, and capacity of the system, while protecting the urban dwellers. Such adaptation measures must be defined case-by-case, but can be classified as (i) direct physical interventions to the transport infrastructure, such as protective measures, grey infrastructure and NBS, improvement of existing drainage and integration of sustainable urban drainage systems; and, (ii) interventions to the vehicles and operation, such as improvement of thermal insulation of buses, use of high-efficiency AC systems, training of drivers and update of emergency plans (see Table 3 in Annex 24 for more examples).

The impact of adaptation interventions will be reported as the cost required for rehabilitation and improvement of physical assets that will increase the resilience of the IEUTS. Adaptation interventions will also be evaluated to determine their climate resilience benefits through an associated ratio that will use a combination of metrics. Applying

[72] Based on hydrogen truck with 0-emission grid

the climate resilience benefit methodology to each project valorises its physical climate outcomes while placing it in the context of the local, project specific climate risks.

D.2. Paradigm shift potential (max. 500 words, approximately 1 page)

The **paradigm shift** of the proposed Program is achieved by having as long-term outcomes an EV friendly policy environment where successful EV city and national policies have been replicated at the national and regional level; a mature EV ecosystem; a charging and grid infrastructure which facilitates a mass EV deployment; and enabling financial and business models. Accelerated EV investments take place due to experiences made, business models established, reduced entry barriers, lower costs and new market players. The transformative shift is possible through the uptake of commercial EVs (the countries included in the Program at this moment only have pilot EV fleets) and the improved ecosystem for EVs resultant of the concrete interventions as well as of policy assistance and capacity building. The transportation sector is transformed to a sustainable low-carbon and climate resilient urban mobility system with a dominance of public transportation and inclusion of NMT and electric micro-mobility. Multiple countries in the region are establishing Green Recovery Plans due to the COVID-19 crisis as a vehicle to transform the society by investing in profitable infrastructure which creates economic, environmental and social benefits, short-term jobs and a long-term greening of the economy. Electrified, sustainable and climate resilient mobility systems are thereby a core feature.

The **potential for scaling up and replication** is ensured at the national and the international level through capacity created in the E-mobility ecosystem, proven cases of successful business models, improved profitability and reduced risks of EV investments and knowledge products. The experience of various countries shows that once fleets of EVs are operational and not only pilot projects, the technology is taken up quickly if the business environment is conducive. The projects financed under this Program function as trigger projects demonstrating the commercial viability of EVs. Performance risks are reduced greatly, and business models have been introduced which make the uptake of EVs on a purely commercial base viable. This is linked with decreasing investment costs of EVs reaching cost-parity to fossil units in the medium term. Scaling up and replication is also enabled through TA at policy level including the development of sectoral roadmaps, design and establishment of appropriate policy incentives and knowledge management instruments as well as capacity building.

Potential for knowledge sharing and learning: The TA Component includes capacity building, technical resources for training and monitoring. Technical assistance is used to ensure delivery of adequate training from equipment suppliers or third parties for EV and charger operations and maintenance, safety trainings and capacity building in optimal management of EV fleets. Training materials, reports and knowledge products elaborated under this header in the different countries will be shared through multiple channels under the knowledge management strategy. This will be realized at a national level thus removing one of the barriers to more widespread deployment of EVs in each country and also on an international level by sharing documents and experiences between countries and also with countries outside the Program. The Program will also develop professional knowledge products and share experiences and cases through channels such as webinar, electronic reports, case-studies, and workshops to disseminate experiences and build a base for replication. The Program will use existing channels within IDB as well as those of other platforms for information dissemination.

Contribution to the creation of an enabling framework: The TA Component includes the support of enabling policies for EV deployment: Technical support will be provided to the relevant national and local authorities in order to set-up, improve and/or enforce enabling public policies and legal, regulatory, fiscal and/or normative frameworks for e-mobility. One of the main instruments used thereby are sector roadmaps for electrification of public transport, roadmaps for electrification of taxis, roadmaps for a hydrogen economy and for electrification of trucks as well as vessels. Whilst various countries have general EV roadmaps or targets these remain at a macro-level. Sectoral roadmaps combined with investment projects perform a base for more specific targets, intervention instruments and actions allowing to take steps towards actual implementation. Sectoral and specific roadmaps are a tool to steer climate investments and initiatives beyond the Program's scope and will help to inform and/or further detail the countries long term mobility strategies and their Nationally Determined Contributions.

Contribution to the regulatory framework and policies: The TA Component includes activities such as roadmaps (see above) which outline an agreed-upon set of pragmatic and realistic measures to achieve EV sectoral targets. Regulatory activities realized by the Program will also include aspects such as battery management and disposal regulations, charging infrastructure standards, pricing policies for EV charging, public transport regulatory aspects including aspects such as concession contracts (concession length, vehicle turnover guarantees), separation of vehicle

ownership and vehicle operations, tariff structure etc. Technical assistance in this area is linked up with investment projects making it more credible and pragmatic.

Overall contribution to climate-resilient development pathways consistent with relevant national climate change adaptation strategies and plans: Transport contributes almost one-quarter of the current global energy-related GHG emissions and is growing faster than any other energy end-use sector. Limiting the global temperature increase to below 2 degrees Celsius requires changing this transport emissions trajectory. The Paris Declaration on Electro-Mobility and Climate Change & Call to Action, calls for the deployment of EVs compatible with a 20% share of all road transport vehicles in 2030. As of mid-2021 only Chile and Colombia had significant e-bus fleets. In Chile the Program will not support further e-bus purchase whilst in Colombia e-bus projects are limited to intermediate cities without mass rapid transit system. All countries have expressed their keen interest in embarking on this transformational shift towards e-mobility. Without significant GHG reductions in the transportation sector countries will not be able to achieve their decarbonization plans. Fostering e-mobility and kick-starting EV deployment is thus consistent with relevant national climate -resilient development pathways. The Program also combines mitigation with adaptation measures by linking e-bus investments with urban development including investments in climate resilient urban infrastructure and by developing especially in SIDS projects which can increase the grid resilience (e.g., V2G, hydrogen energy storage or 2nd hand EV batteries as energy storage units).

D.3. Sustainable development (max. 500 words, approximately 1 page)

Sustainable Development Goal alignment

The Program has as main target to reduce GHG emissions. It contributes significantly to sustainable development goals (SDG) 3 (“good health and well-being”), SDG goal 7 (“affordable and clean energy”), SDG goal 9 (“industry, innovation and infrastructure”), SDG goal 11 (“sustainable cities and communities”), and SDG 13 (“climate action”).

Environmental co-benefits

Major environmental co-benefits are reduced pollutants and noise emissions. The major concern for air pollution in cities is $PM_{2.5}$ and NO_x emissions. The impact of the Program on these pollutants has been quantified based on combustion emissions of new fossil baseline vehicles using the EU COPERT model i.e., this is a conservative approach as emission reductions are not based on comparing the old replaced with a new EV but on comparing a new (BAU) fossil with a new EV. For the methodology used, the database as well as calculations see Annex 22. The following table shows the estimated reduction of pollutants per vehicle category.

Table 9: Lifetime Reduction of Pollutants per Vehicle (average figures for Program countries in tons)

Vehicle type	$PM_{2.5}$	NO_x
Urban bus (12m)	0.07	9
Taxi	0.001	0.05
40t truck	0.1	15
300 passenger vessel	10	580

Source: Grutter Consulting; see above and Annex 22b

The following table shows the projected impact of the Program.

Table 10: Projected Lifetime Pollutant Reductions per Program Component (in tons)

Component	Projected tons of $PM_{2.5}$ reduced	Projected tons of NOx reduced
1. Electric buses and urban mobility	34	4,217
2. EV fleets	0	12
3. Pilot projects	515	992
Total Program	**549**	**5,221**

Source: Annex 22c

Additional non-quantified environmental co-benefits are reduced noise emissions and reduced water pollution caused by fossil vessels. I

Social co-benefits

The major social benefit is improved air quality (plus reduced noise). Air pollution is a major problem in most Latin American cities with levels affecting seriously human health. According to the latest urban air quality database, 98% of cities in low- and middle-income countries with more than 100,000 inhabitants do not meet WHO air quality guidelines[73]. The WHO estimates that annually 4.2 million deaths result due to excessive exposure to fine particulate matter equivalent to 7.6% of all deaths[74]. The poor are disproportionately affected by air pollution as they tend to live and work closer to its sources[75]. Children and the elderly are particularly vulnerable. Recent studies show that women are more affected by poor air quality than men[76]. The transportation sector is thereby a major source of urban air pollution. Commercial fossil vehicles are a major source of air pollution in cities. Although they do not represent a majority of vehicles they are extensively used (large mileage), have high emission factors and are basically diesel powered. Replacing such vehicles with EVs thus has a significant impact on air quality and health of people.

Other social benefits of the Program are related to increased patronage of public transport, NMT and micro-mobility resulting in less accidentality, less congestion, time savings and improved quality of life in cities.

The increased resilience of urban infrastructure and increased grid resilience also results in social co-benefits of people which would otherwise be affected especially by extreme weather events resulting in disruptions of mobility services and of electricity supply.

The COVID'19 pandemic has created an unprecedented challenge for many Latin American countries, from the health and economic perspectives, but it is also opening new opportunities for an accelerated sustainable transformation of its energy, transport, and urban landscapes while contributing to economic recovery. A recent report prepared by the International Labor Organization (ILO, 2020) shows that fostering of electric mobility can have a significant positive job impact primarily due to the induced impact of savings of consumers on petrol and maintenance resulting in increased spending on goods with a high income elasticity which tend to be labor intensive service-goods. A report of McKinsey also reveals that with the COVID pandemic the interest in EVs has risen amongst customers due to the fact seemingly that the pandemic has raised the awareness among people of the negative impact of fossil transport modes being suddenly being able to experience clean air during lockdowns[77].

Economic co-benefits

The monetary value of reduced air emissions (GHG and air pollutants) has been calculated (see Annex 22 for the methodology, dataset and results). The economic cost of pollution is calculated by assigning a monetary value to emissions of $PM_{2.5}$ and NO_x for each country based on local levels of pollution at the ground level and the impact on health and costs caused by this type of pollution per country. This is based on the exposure of the population to contamination and how increased pollution increases mortality risks using the World Health Organization's dose response functions to concentration. The greater risk of mortality or, more precisely, the cost of premature death is valued economically on the basis of stated preference studies as performed by the OECD. The global warming externality cost is expressed through the social cost of carbon (SCC).

The total economic co-benefits from reduced emissions of the Program are estimated at 400 MUSD of which 74 MUSD due to reduced air pollutants and avoided health costs and the rest due to reduced GHG emissions.

Additional economic co-benefits not calculated at the Program level are for reduced subsidies to fossil fuels, minor usage of foreign exchange for the import of fossil fuels, economic benefits of time savings, accidentality and vehicle operating costs related to increased usage of public transportation and NMT and economic benefits of improved grid and urban infrastructure resilience.

At project level during project design and due diligence the total economic benefits are calculated per project based on the framework and approach of IDB.

[73] https://www.who.int/airpollution/data/cities-2016/en/
[74] https://www.who.int/gho/phe/en/
[75] (Mitchell G., 2003)
[76] (Clougherty, 2010)
[77] Mobility investments in the next normal | McKinsey

Gender-sensitive development impact

Gender issues and development impact will be described in the gender-disaggregated targets in projects' targets. Each program will be required to meet IDB's policy on gender equality. Individual projects will also be guided by the template gender action plan as included in Annex 8. The GAP includes actions and targets to (i) increase women's access to economic opportunities, (ii) increase gender awareness to recognize women as part of the electromobility sector and address their and (iii) include gender activities, specially safety initiatives, in the projects financed with the development of gender toolkits and gender cases and the support in the development of gender action plan for the projects financed.

D.4. Needs of recipient (max. 500 words, approximately 1 page)

The following barriers hindering a take-up of EVs in the countries involved have been identified:

- High upfront investment;
- Lack of profitability of EV investments;
- High risk of EV investments (financial and technical risks);
- Lack of know-how on appropriate system design, business models, financial models and technical know-how;
- First-mover problem as no commercial EV fleets yet operate in the country or comparable cities of the country;
- Lack of an enabling (policy) framework for EV deployment.

IDB has realized benchmark costing studies on the different vehicle segments for different price ranges and countries. This services to determine the commercial attractiveness of EVs versus fossil vehicles in terms of TCO, relative profitability, capital requirements and risks. This again serves as base to structure the financial instruments required to resolve the barriers to commercial viability of EVs in the selected vehicle segments. The conclusions from the benchmark study are that countries which have provided for financial incentives have been able to get on the path of mass deployment of EVs whilst other countries got stuck in the pilot stage.

Contrary to renewable energy generation that is increasingly cost competitive, EVs are not yet commercially viable. Commercial EVs in program countries are at the verge of the market growth stage but will not take this step from pilots to commercial growth without an impulse. If unaddressed, commercial EV deployment on a mass scale will not take place in the Program countries in the next 5-10 years with exception of e-bus systems in major cities in Colombia and Chile where the step from pilots to mass deployment of e-buses has already taken place and therefore does not require further support and assistance from the GCF. The transformation towards low carbon transport systems in other countries (plus in Colombia in cities without mass rapid transit system) will be delayed without concessional finance. The EV sectors targeted have (i) limited access to commercial funding, (ii) early-mover costs and disadvantages including high performance risks (iii) lack of sufficient commercial viability including profitability and acceptable risk levels. This is even more pronounced in electric vessels, hydrogen transport applications and V2G mobility solutions which are still at an introductory and experimental market stage Therefore financiers are not in a position to fund such activities with commercial loans at the current stage.

Governments and transport operators also lack capacity and know-how on the appropriate technology choices, the most appropriate and conducive policies and business models to foster in a cost-effective manner EV deployment. This is clearly evident from public statements in favor of electric mobility which is however not followed up with concrete actions and implementations.

D.5. Country ownership (max. 500 words, approximately 1 page)

Section B1 already includes a short overview of countries including the carbon grid factor, population and vehicle data, energy prices and major EV policies. This section therefore focuses on the climate policies of the involved countries. In the framework of the elaboration of the Program Concept Note and the Funding Proposal, IDB has held meetings with the NDAs of the Program countries and key actors in e-mobility to ensure that the FP responds to the country's needs.

Barbados

The GHG emissions of Barbados are 3.79 $MtCO_{2e}$ excl. LUCFs in 2018. Same year transportation emissions are 0.46 $MtCO_{2e}$ (18% of total emissions excl. LUCF) transport emissions have remained constant since 2010 (total emissions

also)[78]. The climate change risk profile of the country is dominated by coastal and weather effects, especially sea level rise, storm surge, and increased tropical storm and hurricane intensity and frequency. Barbados wants to put its efforts into a green recovery to exit from the COVID-19 pandemic. This includes a transformation for inclusive and sustainable development including accelerated investments in green mobility (Government of Barbados, 2021, S. 12).

The updated NDC of Barbados has put as target for 2030 to be a 100% green and fossil-free island-state. This is an aspirational goal and would require for example the retrofit or replacement of all fossil powered vehicles or the substitution of fossil with zero-carbon emission fuels. The unconditional (conditional) target per 2030 is a reduction of 35% (70%) of GHG emissions relative to a BAU scenario. The 2021 Physical Development Plan (PDP) and the same year Roofs to Reefs Program (R2RP) which operationalizes the PDP are the relevant framework for Barbados' resilience goal. The PDP guides future development of the country inter alia in mobility. The R2RP has as one focal area distributed electricity generation. It has received from the GCF readiness support from the GCF for its development. The updated NDC has as target that 100% of electricity produced is renewable by 2030 (as of 2016 97% of electricity was fossil produced)[79]. By 2030 100% of the vehicle fleet shall be either electric or powered by biofuels. Based on standard vehicle replacement rates even if 100% of all newly sold vehicles would be electric by 2025, the vehicle stock will still be >70% fossil by 2030 i.e. to have fossil free mobility within such a short time-frame, the largest burden would initially on biofuels. The NDC states that the starting point will be public buses and light duty / passenger vehicles. The government already operates 35 e-buses since August 2020.

Chile

Chile's GHG emissions excl. LUCF are 2018 110 $MtCO_{2e}$. The emissions of the transport sector in the same year are 28$MtCO_{2e}$ or 26% of total GHG emissions. Transport emissions have grown since the year 2000 on average annually by 2.9% whilst total GHG emissions grew on average by 2.4%[80]. At the end of 2017 Chile published its National Electromobility Strategy, a document realized jointly by the Ministry of Energy, the Ministry of Transport and Telecommunications and the Ministry of the Environment (MinEN, MTT, MMA, 2017). The National Strategy for Electromobility is currently being updated. Chile has also a National Green Hydrogen Strategy (MinEN, 2020). The updated NDC has as target that the country will be carbon neutral by 2050. It includes a decarbonization plan of the electric matrix by 2040 which would also result in higher GHG emission reductions of electric mobility (the 2018 carbon grid factor of Chile is 0.418 $kgCO_{2e}$/kWh). It is not structured on the basis of sectoral mitigation target but includes a set of transport-related goals and measures to lower the sector's emissions, namely electric mobility, shifting modes and green hydrogen. The updated NDC specifically also includes the reduction of Black Carbon to mitigate short-lived climate pollutants. This can be achieved well with e-mobility. Within electric mobility the following targets are set: (i) 100% of e-taxis by 2050; (ii) 100% of electric public transport buses by 2040; (iii) 60% of light vehicles in stock, private and commercial, shall be electric by 2050. For hydrogen the targets are that 71% of cargo transport shall use green hydrogen by 2050 and 12% of motor usage in mining and industry shall use hydrogen. The Ministry of Energy estimates that electric mobility alone will contribute to 17% of the decarbonisation scenario projected for Chile by 2050. Chile has numerous policies and incentives to promote different categories of electric vehicles including buses and taxis and has as of mid-2021 more than 800 e-buses operating primarily in Santiago de Chile.

Colombia

Colombia's GHG emissions for 2014 are estimated at 237 $MtCO_{2e}$. Transportation emissions are 29 $MtCO_{2e}$ (31% of total emissions) with a growth of 20% since 2010. Colombia's NDC Update estimates that according to the reference scenario for 2030 emissions would reach 346 $MtCO_{2eq.}$ Within the mitigation goals Colombia commits to emit a maximum of 169 $MtCO_{2e}$ in 2030 (equivalent to a 51% reduction of emissions). The NDC contemplates for the transportation sector amongst others to achieve 600,000 registered electric taxis, buses, light commercial vehicles including small trucks and official vehicles. The Electric Mobility Law has managed to provide for measures in public transportation services such as compliance with a minimum quota of 30% of EVs in new acquisitions or contracts, taking into account the commercial offer in Colombia. According to the same law, the goals for the incorporation of EVs in the acquisition of the fleet of zero-emission mass transportation systems must follow the scheme of minimum proportions of 10% in 2025, 20% in 2027, 40% in 2029, 60% in 2031, 80% in 2033 and 100% in 2035 (Congress of Colombia, 2019). As a complement to the Law, the National Government has developed the National Strategy for Electric Mobility, which aims to promote the electrification of the transportation sector. In addition to the above, the

[80] Chile | Transportation | Greenhouse Gas (GHG) Emissions | Climate Watch (climatewatchdata.org)
[80] Chile | Transportation | Greenhouse Gas (GHG) Emissions | Climate Watch (climatewatchdata.org)
[80] Chile | Transportation | Greenhouse Gas (GHG) Emissions | Climate Watch (climatewatchdata.org)

National Energy Plan 2020-2050 presents projections for the incorporation of EVs, under the scenario of meeting the GHG reduction commitments (20% by 2030) (UPME, 2019). Projections for 2030 include 630,000 electric motorcycles, 370,000 electric light vehicles, 40,000 e-taxis and 20,000 electric urban freight vehicles.

Costa Rica

Total GHG emissions of Costa Rica are estimated at 10.9 million tCO_{2e} in 2019 with land transport being responsible for more than 50% of emissions. Emissions under a BAU scenario are expected to increase by 45% by 2050. The updated NDC of Costa Rica includes as target net emissions of 9.1 $MtCO_{2e}$ by 2030 and holds on to the net zero target by 2050. Greening the transportation sector is key to achieving these targets. Electrifying mobility is considered as essential and a national priority. The updated NDC has quantified 2030 electric mobility targets for public transport, passenger cars and fleets (8% of the vehicle stock). For other vehicle areas e.g., motorcycles targets and measures shall be developed to migrate towards EVs. Costa Rica has also developed a national plan for electric transport which includes concrete steps towards electrification of vehicles and has approved 2018 the law on incentives and promotion of electric transportation which includes targets for EV penetration, the establishment of a public charging infrastructure as well as important tax incentives for private EVs.

Dominican Republic

In 2015 the gross GHG emissions of the Dominican Republic were 35 million tCO_{2e} (Gobierno de la República Dominicana, 2020) of which 35% (7.7 million tCO_{2e}) from the transport sector[81]. The updated version of the Nationally Determined Contribution NDC-RD 2020 (Gobierno de la República Dominicana, 2020) has as target a 27% reduction in GHG emissions in relation to a BAU scenario by 2030. In terms of electric mobility, the NDC-RD proposes (i) Electrification of the fleet of diesel buses; (ii) Renewal of public transportation vehicles, such as cabs and "conchos" with electric and hybrid vehicles; (iii) Introduction of electric buses for school transportation service; (iv) Regulation and creation of policies to encourage the transition to electric and hybrid mobility for private usage. In 2020 the Dominican Republic adopted a National Strategic Plan for Electric Mobility (INTRANT, 2020) developed by INTRANT in collaboration with the IDB. It provides for a short-, medium- and long-term transformation of the transportation sector. The plan is aligned with both the UN SDGs 2030 and the Sustainable Development Plan 2030 of the Dominican Republic (Ministerio de Economía, Planificación y Desarrollo , 2012) and aims at all modes of road transportation. Targets of the plan are 30% of official vehicles and public buses shall be electric by 2030, whilst the target for the private sector is 10%. 14,000 public chargers shall be operational by 2030. By 2050 the respective goals are 100% EVs for official vehicles and public buses and 70% of all private vehicles shall be electric. For the freight sector the target for 2050 is 50% of all units to be electric.

Jamaica

Jamaica's 2018 GHG emissions excl. LUCF are estimated at 10 $MtCO_{2e}$ with transportation accounting for 2.3 $MtCO_{2e}$ or 23% of total emissions. Transport emissions have grown since 2000 by annually on average 1% whilst total emissions have decreased in the same period by 1%[82]. The updated NDC of Jamaica has a conditional and unconditional target relative to a BAU scenario. Jamaica plans to increase its share of renewables in electricity generation creating a greener grid. The country is lagging behind in the uptake of EVs when compared to other countries in the Caribbean. The adoption of EVs in the transport sector however aligns with the National Energy Policy goals for secure energy supply, efficient use of energy, and minimizing the environmental impacts of energy production and utilization. Jamaica Public Service is deploying charging infrastructure and the Jamaican Office for Utility Regulation is discussing an EV charging tariff for public charging infrastructure[83] (JPS, 2021) whilst the Ministry of Science, Energy and Technology proposes a target of EV take-up of 10 per cent of the transport mix by 2030 (around 50,000 vehicles).

Panama

Panama's 2018 GHG emissions excl. LUCF are estimated at 18 $MtCO_{2e}$ with transportation accounting for 4.8 $MtCO_{2e}$ or 27% of total emissions. Transport emissions have grown since 2000 by annually on average 4.1% whilst total emissions have increased annually on average in the same period by 3.2%[84]. The updated NDC has set a target of

[81] www.climatewatchdata.org
[82] www.climatewatchdata.org
[83] Time of use residential tariff plus 5%
[84] www.climatewatchdata.org

reducing at least 11.5% of total emissions from the energy sector in 2030, and 24% in 2050 with transportation accounting for about 50% of the sector's emissions. It includes concrete e-mobility targets as percentage of vehicle stock: 10% of all private vehicle fleets, 25% of private passenger cars, 20% of public transport vehicles and 30% of government vehicle fleets shall be electric by 2030. For 2050 the targets are 30% of all private vehicle fleets, 75% of private passenger cars, 60% of public transport vehicles and 90% of government vehicle fleets. The National Strategy for Electric Mobility has similar goals for 2030 (i) 10-20% of the total fleet of private vehicles shall be electric; (ii) 25-40% of private vehicle sales shall be electric; (iii) 15-35% of the buses in the authorized concession fleets shall be electric, and (iv) 25-50% of the public fleets shall be electric. The National Energy Plan 2015-2050 promotes a higher share of non-conventional renewable energy (39%) towards 2050 versus 4% penetration in a baseline scenario. The Energy Transition Agenda 2020-2030 proposes, among others, to decarbonize transport sector through e-mobility.

Paraguay

Paraguay's 2018 GHG emissions excl. LUCF are estimated at 49 $MtCO_{2e}$ with transportation accounting for 7.6 $MtCO_{2e}$ or 15% of total emissions. Transport emissions have grown since 2000 by annually on average by 5.7% whilst total emissions have increased annually on average in the same period by 2.6%[85]. Paraguay's updated NDC aims to reduce 20% of the GHG emissions by 2030, compared to the projected baseline of which 10% unconditional. The NDC as transport measure the substitution of ICE with electric and hybrid vehicles without including a specific target. It also previews the usage of hydrogen in the transportation sector (especially for heavy-duty trucks). Five different scenarios have been constructed: scenarios 3 to 5 include increasing penetration levels of electric and hydrogen vehicles. Paraguay has three hydroelectric plants that generate a large surplus of renewable energy, thus EVs provide the opportunity to reduce various environmental and financial externalities resulting from mobility dependent on fossil fuels. In this context, the country is taking its first steps in the transition towards electric mobility, advancing with the development of technical standards for EVs, and implementing "green routes" with chargers installed between the three main cities – Asunción, Ciudad del Este, and Encarnación. The National Development Plan 2030 and the National Energy Policy 2040 consider e-mobility as one of the dimensions to achieve the country's development goals. The Agenda for the Transition of Technology towards Electromobility is structured around five fundamental axes under a common vision of promoting the adoption of EVs and 21 strategic lines that shall allow the achievement of the objectives. The Guide for the Standardization of Electric Mobility in Paraguay, published in 2020, shall provide the basis for regulations and standards related to e-mobility.

Uruguay

Uruguay's 2018 GHG emissions excl. LUCF are estimated at 36 $MtCO_{2e}$ with transportation accounting for 3.6 $MtCO_{2e}$ or 10% of total emissions[86]. Uruguay's NDC target certain goals towards 2025 for E-motion categories. Also, Uruguay aims at establishing a network of electric vehicle charging stations throughout the main roads across Uruguay. The most relevant policies for the country's climate change agenda are the following: (i) In its NDC, Uruguay's specifically target to attain 110 units e-Buses, 550 units e-taxis, and 900 units e-LCVs; (ii) The National Climate Change Policy promotes several initiatives to mitigate transport sector GHG emissions, among others, the increase share of electric vehicles, hybrids and other, in the different transport subsectors; (iii) The National Environmental Plan for Sustainable Development, established in 2019, brings together the main environmental strategies and lines of action in the country; (iv) The National Sustainable Mobility Plan is an outcome of the National Environmental Plan for Sustainable Development. The plan promotes a transition towards transport technologies with better energy efficiency, lower emissions through several initiatives (incentives, regulation, among others) until 2030. Also, it has a strategic line to improve public fleets in their renewal process and the development of a scrapping program to remove older vehicles; (v) The Energy Policy and the approved Energy Efficiency Law establishes the need to reduce fossil fuel consumption in the transport sector.

Regional Initiatives

The GEF Global E-Mobility Program implemented by the UN Environment Program (UNEP) in partnership with the International Energy Agency (IEA) is active in various targeted countries. Its focus is on technical assistance and pilot projects i.e., it complements very well the proposed Program. Complementarity will be ensured through close coordination with the existing programs and initiatives. The proposed Program is focused on investment projects and market transformation whilst existing initiatives are more for creating readiness for electric mobility in general.

[86] www.climatewatchdata.org

[86] www.climatewatchdata.org

Engagement with Civil Society

In each country IDB has performed multiple interviews and meetings with all major stakeholders including national and local governmental bodies, energy utilities, transport operators and civil society.

D.6. Efficiency and effectiveness (max`. 500 words, approximately 1 page)

The Program introduces a concessional financing mechanism that addresses barriers to the uptake of commercial EVs and supports a transformative shift to low carbon transportation. GCF concessional financing is critical – in absence of concessional GCF finance, such projects will not materialize in the short or medium term. The e-mobility report (Annex 2a) clearly shows that all countries with large fleets of commercial EVs have used, at least initially, financial support instruments in the form of grants to kick-start EV deployment.

The major financial barriers for the potential beneficiaries which prevent alternative financing options are (i) the low financial profitability of EV investments reflected in the low FIRR and very long payback times (ii) the high risk profile of EV investments due to performance risks, asset risks (e.g. re-sale value of assets), and replacement investments (batteries) and (iii) high capital and investor's capital demand resulting in high debt and risk exposure levels of the investing entity. Commercial funding is thus not willing to enter this market. Conventional financial institutions are also not willing to enter the market due to the novelty of the technology. Concessional GCF finance including grants can provide for technical assistance to design and structure in an optimal manner e-mobility investments and reduce design and performance risks whilst the financial instruments reduce risk exposure and increase profitability of the investment.

Projects involved in the proposed Program will not be dependent on a continuous flow of GCF funds. Rather, the Program aims to achieve substantial reduction in the need for concessional financing in future project. It is expected that, over the course of implementation of the Program, commercial e-mobility will gradually move towards commercial viability in countries which have kick-started the process. The use of GCF funds de-risks similar future investments and demonstrates the viability of e-mobility investments in commercial terms.

The FIRR and EIRR of individual projects is determined during the project preparation and the due diligence phase. IDB will assess the financial soundness of each project. The Program EIRR is estimated at 20% (see Annex 3).

The total capital investment is 450 MUSD with a requested GCF finance of 200 MUSD and a GHG reduction of 7.55 $MtCO_2$ resulting in an effectiveness of the GCF investment of 26 USD/tCO_2. Only 54% of the GCF investment however goes to mitigation and 46% is for adaptation which explains also the high abatement costs. Also, GHG marginal abatement costs of transport projects tend to be higher than of other interventions as they are also not realized primarily due to the GHG impact. The value of 26 USD/tCO_{2e} is significantly lower than applying the subsidy finance as given by countries with significant EV numbers for buses which result in average costs per tCO_2 of 227 USD (see table below).

Table 11: Average GHG Abatement Cost of Fostering E-Buses

Country	CAPEX subsidy per bus USD	Carbon factor of grid (kg CO_2/kWh)	GHG reduction per bus lifespan tCO_2	Cost per tCO_2 in USD
PR China (subsidy level 2019; former years significantly higher)	40,000	0.71	412	97
India (FAME II)	80,000	0.90	626	128
Germany (2019)	300,000	0.51	1,039	289
UK (2019 level)	230,000	0.25	1,307	176
Switzerland (only carbon finance; excludes additional municipal subsidies, 2020)	200,000	0.04	1,521	132
Poland (2019)	300,000	0.90	630	476
USA (2019)	400,000	0.43	1,116	358
Chile initial 200 e-buses (2019)	180,000	0.42	1,130	159
Average				**227**

Source: Grutter Consulting; see Annex 2a
Notes:
1. Subsidies include those for buses and chargers
2. Carbon grid factor based on IEA for 2018

3. GHG reduction based on lifespan of 16 years of bus (iexcept PR China where major cities have a maximum age level of 8 years), WTW
4. Based on 12m urban Euro V diesel bus; 65,000 km/a; EEA COPERT data for fuel usage of diesel bus; e-bus 1.0 kWh/km

56% of the total investment is co-financed (leverage ratio of 1.3).

E. LOGICAL FRAMEWORK

E.1. Project/Programme Focus

☒ Reduced emissions (mitigation)

☒ Increased resilience (adaptation)

E.2. GCF Impact level: Paradigm shift potential (max 600 words, approximately 1-2 pages)

Assessment Dimension	Current state (baseline)		Potential target scenario (Description)	How the project/programme will contribute (Description)
	Description	Rating		
Scale	Transportation in Program countries is nearly to 100% fossil fuel based. Most cities suffer from decreasing mode shares of PT due to lack of convenience of the systems. NMT is poorly developed with no or only very limited dedicated cycle lanes. Urban transport infrastructure is often not resilient to extreme weather events resulting in many cities in flooding events.	Low	The paradigm shift is a move from fossil to electric vehicles including road-based transport as well as vessels. A behavioral shift towards public and non-motorized transport is expected based on the Program activities which increase the attractiveness of non-private means of transport. Cities evolve to being people instead of car oriented. A shift towards resilient urban transport systems takes place in cities.	The Program intervention already reduces 7.55 $MtCO_2$. The shift to e-mobility goes in scale beyond the project as initial positive applications are scaled up within the city to encompass the entire fleet. Pilot projects on H2 or V2G already include a business approach for commercial upscaling e.g., by working along the entire value chain of a hydrogen economy and ensuring that pilot results and approaches can be scaled up massively in short time. The establishment of more livable urban centers with a more convenient PT system, a safer NMT based on exclusive cycle lanes and improved pedestrianization and through PT mode-integrated electric micro-mobility results in attractive urban centers with a shift towards public and NMT. Results obtained in certain areas of the city can then be scaled up to the entire city as stakeholders recognize the improved quality of life. The interventions of the Program towards gender sensitive

				transport systems allows to upscale the usage of PT and especially of NMT of women. Means and methods to make the urban transport infrastructure in a cost-effective manner more resilient towards climate events are applied in certain areas of the city. Again, this can be scaled up assuming positive results to the entire city.
Replicability	Electric mobility is not yet used at scale and thus replicability is very limited to individual purchases. Limited experience with NMT and high-quality PT means is available in the different countries with efforts not being sufficient yet to revert the decreasing mode share trend of PT.	Low	The combination of successful implementation of new business models and electric fleet operations combined with the market force of decreasing EV prices form the base of a fast and massive replication potential. Cities which adopt successfully a people-centered urban mobility system with a focus on high quality PT and NMT will be replicated within the country and can serve as lighthouses also for other countries. This replication effect in mass transit has been clearly demonstrated e.g., with the rollout of BRTs worldwide triggered by Curitiba and Bogota or the rollout of metros in India triggered by the successful implementation of Delhi metro. Cost-effective resilient urban transport infrastructure will also see replication across other cities which want to avoid high future costs caused by climate events.	Through knowledge management instruments successful business models, performance results of EVs and the results of EV pilots will be disseminated amongst stakeholders. Capacity created will also allow to design new systems at a high quality. Once the high initial barrier in electric mobility of uncertainty about performance, operational risks and financial cum business models to make them commercially viable is removed, the lower total cost of ownership is a core argument to achieve widespread replication. The same approach applies to replication of successful urban development models for cities. Well documented methods and means to increase the resilience of urban infrastructure and demonstrating the cost-effectiveness of such interventions allows other cities to make similar interventions as they will have the information, the concepts and the know-how how to approach the task.

Sustainability	The NDCs of countries increasingly include targets on EVs as well as improving PT. However, targets are often not lined with a regulatory framework and an attractive business proposal thus not achieving the goals. Also, investments in mass transit systems are taking place in many countries. However, they are often not linked up with integration into NMT and micro-mobility means and do not include climate resilient measures thus remaining often in pure infrastructure investments with limited behavioral or paradigm change.	Medium	Successful business models and a policy framework which effectively encourages the adoption of e-mobility linked with decreasing market prices of such vehicles make efforts sustainable. Lining PT with NMT and micro mobility and climate proofing investments results in a sustainable behavioral change towards NMT, and PT linked with various forms of micro-mobility.	The program will work with local and national institutions in developing mechanisms and modes to ensure resilient transport infrastructure. It will also with the private and the public sector in designing and implementing business models and policies which are effective in encouraging the adoption of EVs.

E.3. GCF Outcome level: Reduced emissions and increased resilience (IRMF core indicators 1-4, quantitative indicators)						
GCF Result Area	**IRMF Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target**		**Assumptions / Note**
				Mid-term[87]	**Final[88]**	
MRA2 Low-emission transport	Core 1: GHG emissions reduced, avoided or removed/sequestered	Ex-ante and ex-post analyses (conducted by a 3rd party independent contractor)	0	226,964tCO_{2e}	End of Program: 1,176,240tCO_{2e}	No delays in implementation which would result in lower midterm and final but not lifespan GHG reduction. Lifespan: 7,547,602tCO_{2e} Lifespan calculations dependent on measure and country for EVs (maximum 16 years), 20 years for PT & 30 years for NMT infrastructure. Annual average GHG reduction of 387,043t and 6,590 TJ energy saved Source: Annex 22c FP Methodologies: CDM ACM0016 (PT), AMS.III.C (EVs) and GEF methodology for NMT
	Supplementary 1.1: Annual energy savings	Ex-ante and ex-post analyses (conducted by a 3rd party independent contractor)	0	10,949TJ energy saved	End of Program idem lifespan: 23,452 TJ	

[87] Cumulative impact year 1 to 3

[88] Cumulative year 1 to 6; The final target means the target at the end of project/programme implementation period. However, for core indicator 1 (GHG emission reduction), please also provide the target value at the end of the total lifespan period which is defined as the maximum number of years over which the impacts of the investment are expected to be effective.

ARA3 Intrastructure and built environment	Core 2: Direct and indirect beneficiaries reached	Ex-ante and ex-post analyses (conducted by a 3rd party independent contractor)	0	Direct: 723,149 Women: 362,125 Indirect: 3,721,852 Women: 1,847,826	Direct: 1,446,298 Women: 724,249 Indirect: 7,443,703 Women: 3,695,651	The number of direct beneficiaries is the population using PT. The number of indirect beneficiaries is the total population beneficiating from IEUTS investments. Data will be provided gender disaggregated. Program's beneficiaries are only calculated for adaptation related interventions and not for mitigation.
ARA3 Intrastructure and built environment	Core 3: Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions	DCRAs[89]	0	Component 1: 48,500,000 Component 2: $8,500,000	Component 1: $97,000,000 Component 2: $17,000,000	Estimate values are based on the value of projects approved by the IDB reporting under the IDB Corporate Results Framework (CRF)'s indicator "2.23 Value of investments in resilient and/or low carbon infrastructure ($)
ARA3 Intrastructure and built environment	Supplementary 3.1: Change in expected losses of economic assets due to the impact of extreme climate-related disasters in te	Model developed for the project will be run using a specialized software package to assess risks	0	$7,080,000	$14,160,000	Based on damages caused by flooding as it is the most common hydrometeorological hazard

[89] To be performed during Sub-Projects duediligence

	geographic area of the GCF intervention					with the highest economic impacts in urban areas

E.4. GCF Outcome level: Enabling environment (IRMF core indicators 5-8 as applicable)

Core Indicator	Baseline context (description)	Rating for current state (baseline)	Target scenario (description)	How the project will contribute	Coverage
Core Indicator 5: Degree to which GCF investments contribute to strengthening institutional and regulatory frameworks for low emission climate-resilient development pathways in a country-driven manner	Regulatory measures and policies to promote EVs are in many countries weak, incomplete or not enforced.	medium	Regulatory measures and policies are in place which favor the purchase and usage of EVs, especially of commercial units.	Component 4 of the Program is the establishment of a conducive e-mobility framework. The outputs of this component are the establishment of an e-mobility conducive local, national and regional ecosystem, and mainstreaming of increased climate resilience of IEUTS which can lead to new regulatory systems for PT designers	Multi-countries
Core Indicator 6: Degree to which GCF investments contribute to technology deployment, dissemination, development or transfer and innovation	Baseline vehicles are fossil powered. Urban transport infrastructure is often nor resilient to extreme climate events. H2 usage in transportation and V2G technologies are not known. Usage of H2 and batteries of EVs to enhance grid resilience is not used.	low	In all Program countries fleets of commercial EVs operate. In all projects focusing on urban areas methods to increase the resilience of urban transport infrastructure have been implemented. H2 powered vehicles in long-haul transportation and electric vessels are used in at least 2	The Program finances the purchase of E-mobility systems, H2, V2G and e-vessel pilots and climate resilient infrastructure and provides TA for their appropriate design, implementation and maintenance.	Multi-countries

			Program countries. V2G is used in at least 2 SIDS. The Program countries have a vibrant commercial EV market.		
Core indicator 7: Degree to which GCF Investments contribute to market development/transformation at the sectoral, local, or national level	Declining market share of PT and very low market share of NMT. Women share in cycling and micro mobility very low.	low	The increased attractiveness of PT results in increasing passenger numbers and a reversal of the trend of declining PT market shares. Persons use on a regular base NMT and electric micro-mobility means	The project finances and provides TA for the design and implementation of PT improvement measures, cycling lanes, pedestrianization efforts and electric micro-mobility schemes. The Program's work to build gender sensitive infrastructure will support market development. More broadly, the Program will promote the benefits of NMT, micro mobility and PT to the general public	Multi-countries
Core indicator 8: Degree to which GCF investments contribute to effective knowledge generation and learning processes, and use of good practices, methodologies and standards	Limited awareness and know-how on effective business models & policies to promote EVs. Limited know-how and information on effective means to increase the resilience of urban transport infrastructure	low	Various business models conducive to EV fleet deployment have been applied to countries and cities depending on local and national circumstances. Tools for identification and design of climate resilient urban transport measures are applied by multiple cities of Program countries	The Program's KM strategy will ensure that lessons learnt are shared with interested parties and stakeholders on a national, regional and international level.	Multi-countries

E.5. Project/programme specific indicators (project outcomes and outputs)						
Project/programme results (outcomes/ outputs)	**Project/programme specific Indicator**	**Means of Verification (MoV)**	**Baseline**	**Target**		**Assumptions / Note**
				Mid-term	**Final**	
Output 1.1 Fewer urban infrastructure damaged resulting from climatic shocks because of higher investments in vulnerability reduction	Reduction in modeled expected annual economic losses from hydrometeorological hazards per square meter in the IEUTS area[90]	Model developed for the project will be run using a specialized software package to assess risks	0	$8,260,000	$16,520,000	Based on damages caused by flooding as it is the most common hydrometeorological hazard with the highest economic impacts in urban areas. Expected annual losses (PAE) calculated using the trend scenario (2050) for Panama ($0.59) multiplied by four countries (conservative approach). Total expected losses were calculated as the product of expected annual losses for the implementation period (7 years).
Output 1.2. Fewer days to restore the IEUTS' public transport service after climate shocks due to investments in climate resilience	Reduction in the days out of service due to a climate shock	Daily operations report	0%	10%	20%	This will be measured in percentage or in number of days

[90] Bus routes, charging stations, parking, bus stops.

Output 2.1. H2 and V2G pilots are used to assess their viability of mass deployment to improve grid stability	V2G enabled vehicles have delivered electricity to the grid; H2 production sites have delivered electricity to the grid using stored H2Pilot projects have been implemented Potential of V2G and H2 storage as grid stability instruments has been assessed	IDB and 3rd party reports[91] Vehicle, charging infra and production site inventories	0	- All V2G enabled vehicles have supplied at least 20x electricity to the grid - H2 production sites have delivered during at least 20 days electricity to the grid - Report in 1 country on option of H2 for energy storage and increased grid resilience - Report for 1 SIDS on options for usage of batteries of EVs as grid storage and to increase grid resilience - 3 H2 pilots with green H2 production and usage in transportation	- All V2G enabled vehicles have supplied at least 50x electricity to the grid - H2 production sites have delivered during at least 50 days electricity to the grid - Reports in 2 countries on option of H2 for energy storage and increased grid resilience - Report for 2 SIDS on options for usage of batteries of EVs as grid storage and to increase grid resilience - 4 H2 pilots with green H2 production and usage in transportation	H2 produced is more than demanded by vehicles to allow for storage and grid re-insertion Smart grid systems in place at sites for bi-directional chargers

[91] Reports realized by agency implementing the H2/V2G projects and/or reports of consultants engaged for monitoring; annual reports provided

				- 20 FCEV trucks - 10 other FCEVs - 2 V2G projects in SIDS - 10 bidirectional chargers and EVs	- 30 FCEV trucks - 10 other FCEVs - 2 V2G projects in SIDS - 10 bidirectional chargers and EVs	
Output 3.1 -mobility is integrated with PT & NMT measures to foster mode shift to low carbon transport	Electric buses are integrated with PT and NMT / micro-mobility measures	Reports from city authorities in cities with e-bus deployment providing evidence of cycle lanes constructed and in operations and listing PT and NMT measures taken	0	- 2 projects with e-buses and PT/NMT measures - 20km of segregated cycle lanes	- 6 projects with e-buses and PT/NMT measures - 60 km of segregated cycle lanes	Muncipal and national leadership can delay the implementation of urban mobility measures e.g. for construction of cycle lanes which would result in outputs being achieved at a later stage
Output 3.2 EV fleets are deployed with innovative business models to enable their mass application	EV fleets deployed	Vehicle inventories of operators	0	- 150 e-buses - 3 cities with e-buses - 250 e-taxis - 2 pilot e-vessel projects - 90 e-vessels - report on optimal usage of e-vessels - 1 city with urban fast charging infra - Report on business models used	- 470 e-buses - 7 cities with e-buses - 250 e-taxis- 1 city with urban fast charging infra - 2 pilot e-vessel projects - 90 e-vessels - report on optimal usage of e-vessels - Report on business models used	

				for EV deployment	for EV deployment	
Output 4.1 A climate resilient e-mobility ecosystem integrated with urban transport is established to enable uptake of e-mobility	Trainings and CB events realized e-mobility roadmaps	Training and CB event reports by independent 3rd party Roadmaps published by country/city	0	1 event per country 2 roadmaps	2 events per country 3 roadmaps 3 Business model for mass deployment of H2 economy	Trainings and CB events realized
Output 4.2. Strengthened institutional and regulatory systems for climate-responsive planning and development	Institutional and regulatory systems that improve incentives for climate resilience and their effective implementation	Disaster and Climate Change Risk Management Plan	0	3	9	Capacity building and generation of climate information for decision making leads to improved regulatory systems for public transport designers and operators. All projects will have a qualitative or quantitative DRA. DRAs are context-specific and include climate change scenario analysis.
Project/programme co-benefit indicators						
Co-benefit 1: Improved air quality	*Reduced emissions of NOx and PM2.5*	3rd party report based on default values for baseline fossil vehicles replaced by EVs	0	- 80 t $PM_{2.5}$ reduced - 283 t NO_x reduced	- 163 t $PM_{2.5}$ reduced - 1,074 t NO_x reduced	Baseline fossil vehicle emissions based on EU COPERT model; impact based on assumptions of mileage of vehicles

Co-benefit 2: Increased usage of PT and NMT	*Increase in number of PT users and number of NMT users on cycle lanes*	PT operators and surveys realized by 3rd parties	0% growth of PT users per city i.e. the PT users remain constant[92]	- +20% PT users per city projects - 54,000 additional NMT users daily cumulative all project cities	- +20% PT users per city projects - 130,000additional NMT users daily cumulative all project cities	Refers to increased ridership on PT and increased usage of NMT due to measures taken.

E.6. Project/programme activities and deliverables

Activity	Description	Sub-activities	Deliverables
1.1.1. Implement measures to increase climate resilience	E-bus projects are integrated where feasible with low carbon and resilient urban development. The identification & design of these measures is realized under components 1 to 3.		All EV investments undergo climate proofing In minimum 4 cities measures to increase the resilience of urban transport infrastructure are implemented
2.1.1 H2 projects with FCEVs & with grid stabilization measures implemented	Pilot projects are designed and implemented	- design of projects - procurement of goods - implementation of projects	4 H2 pilot projects
2.1.2 V2G projects with grid stabilization measures implemented	Pilot projects are designed and implemented	- design of projects - procurement of goods - implementation of projects	2 V2G pilot projects in SIDS
3.1.1 Construction of cycle lanes and micro-mobility measures	The Program will prioritize solutions that integrate into the urban fabric, are compatible and conducive to modes of sustainable mobility guaranteeing universal access and have important elements for NMT and electric micro mobility.	- design of cycle lanes - construction of lanes	60 km of seggregated cycle lanes
3.1.2 Implement urban mobility measures such as pedestrianization, bus lanes & route structuring		- identification & assessment of intervention options - implementation of selected intervention options	Improvements of pedestrianization in minimum 50% of involved cities Integration of electric micro mobility means in minimum 50% of involved cities
3.2.1 Deployment of e-buses	E-bus fleets are financed based on project design & structuring realized under component 4. This includes the entire system of buses, charging	- Procurement of E-bus fleet including associated components (charging infrastructure, depot, grid connection)	Minimum 7 e-bus projects implemented with 470 e-buses

[92] PT users in baseline assumed as constant

	infrastructure, grid connection and depot upgrades.	- Implementation of e-bus fleet including associated components	
3.2.2 Deployment of e-taxis & fleets with urban fast charging infrastructure	EV fleets are financed based on project design & structuring realized under component 4. EV fleet deployment includes vehicles and their charging infrastructure, grid connection including if required grid upgrades. The component includes also the establishment of urban public fast charging infrastructure oriented towards taxis/ride-hailing vehicles and urban delivery vehicles.	- Design of intervention - Procurement of EV fleet - Implementation of EV fleet - Procurement of urban fast charging infrastructure - Implementation of urban fast charging infrastructure	Implementation of urban fast charging infrastructure in minimum 1 city with 250 electric taxis
3.2.3 Deployment of pilot projects with electric vessels	Financing of electric vessel pilot projects. The pilot project design and structuring is realized under component 5.	- Design of projects - Procurement of equipment - Implementation of vessel pilot projects	2 Pilot electric vessel projects
4.1.1 Urban interventions realized with a gender perspective	Implement GAP	- Develop a technical training program for women. - Develop a training program for women entrepreneurs. - Create an incentive inside the program for the projects to hire women - Include gender lens in the program eligibility criteria for women projects. - Develop a gender training that is included in any capacity building activity in the Regional Sectorial Council of Skills for Electromobility or any activity training in the program. - Include a gender perspective during the design of sectoral roadmaps and	- 30% of women trained in the Regional Sectorial Council of Skills for Electromobility - 1 entrepreneur training programs for women is developed - 50% of projects adhere to the incentive program. - 40% of project that access the program have a gender lens - 100% Of capacity building activities include a gender training module - 100% frameworks or policies that include a gender perspective - Two networks created - One summit organized

		the support of national enabling policies - Develop a network of women in electromobility in LAC. - Organize a regional EV Summit of women in LAC - Carry out a survey among the sector companies to identify women in the e-mobility and hydrogen sectors - Create an electromobility online platform to disseminate sector gender information. - Development of a toolkit to mainstream gender in electromobility projects that can be used for entities applying to the program. - Design a complete GAP for pilot projects included in the FS that incorporate a gender evaluation to create gender cases studies - Develop a GAP in the projects financed by the program - Design and implement safety initiatives for women that include awareness and education, prevention, access to justice, infrastructure with a gender approach, new technological tools, generation of knowledge and job opportunities.	- One survey carried out. - One online electromobility gender platforms created, - One toolkit to mainstream gender. - 6 GAP designed. - 100% of projects include a GAP. - 100% of projects include safety initiatives for women during the design, disaggregated by type of activity. - 100% of projects that include safety initiatives for women during the implementation, disaggregated by type of activity.
4.1.2 Implementation of new business models for e-bus systems			
4.1.3 Design and promotion of EV conducive policies	This is realized on a local, national and regional level. These are activities such as design and divulgation of sectoral roadmaps, hydrogen roadmaps, support of national enabling policies for EV	- TA measures per project identified - TA measures contracted - TA measures implemented	Realized in all Program countries Realized in all invested projects Develop minimum one regulatory system for the Integrated Electrified Urban Transport System operators, defining clear guidelines for the planning, design and operation of the

	deployment, advice on battery re-usage, recycling and disposal and capacity building at a national level. The identification of activities is made at country level when designing the projects The Program will also realize TA activities to identify and assess cost-effective measures to increase the resilience of cities in transport infrastructure linked with e-mobility development and to increase grid resilience through projects in the e-mobility field such as V2G, hydrogen energy storage or usage of 2nd hand EV batteries.		system to make it reliable to future climate (focused on the Caribbean countries). 1 event per country for national level 1 event for regional learning
4.2.1 Apply methodology for climate risk identification			100% of projects complete the climate risk screening and 100% of moderate and high-risk projects have a full disaster and climate change risk assessment and management plan
4.2.2 CB and knowledge generation on H2 and V2G for increased grid resilience	Pilot projects are designed and implemented	- design of projects - procurement of goods - implementation of projects	- 4 H2 pilot projects - 2 V2G pilot projects in SIDS
4.2.3. Training and CB of stakeholders	CB and knowledge are generated with the pilots Training and CB of project participants and regional/national stakehodlers	- TA measures per project identified - TA measures contracted - TA measures implemented - Technical reports on potential for increased grid resilience with H2 - Technical reports on potential for increased grid resilience with V2G - CB events	One learning and Knowledge Management Strategy (KMS) per investment project 2 training events per investment project (including e.g., risk concepts, robust decision making, NBS) - 2 H2 reports - 2 V2G reports - 4 CB events

E.7. Monitoring, reporting and evaluation arrangements (max. 500 words, approximately 1 page)

Monitoring for the Program will be in line with IDB's policies and the terms of the AMA/FAA. Specifically, the implementation of each project will be managed and monitored at project and Program level by IDB's in-house staff, project management unit and procured consultants. As specified in Loan and Grant Agreements between project implementing agencies and IDB, they are obliged to report on the use of proceeds of the Program and the environmental and social performance of the project to the IDB on an annual basis, in line with IDB's standard reporting requirements.

Program Level

IDB will prepare Program-level Annual Performance Reports (APRs) in the format specified by GCF detailing:
a) activities conducted during the year, status of implementation, potential issues and solutions
b) progress against targets and indicators given in this proposal (see above)
The APRs will include further details about each project approved, including rationale, description and screening against the criteria set out in this proposal. Impact potential estimates will be supported by a methodology note.

Project Level

A monitoring manual has been realized to provide a guideline on how to determine the impact of projects (Annex 11).

Evaluations

A mid-term review of the program will be conducted in implementation year 3 to a) take stock of emerging results from the TA activities, b) portfolio distribution, projected impacts and implementation of the first phase of investments under the program c) performance on safeguards and gender and social inclusion. This will be an independent review, undertaken by an external team engaged for this purpose. Based on the review, an updated Gender and Social Inclusion Action Plan (GESIAP) will be prepared and finalized.

A final program evaluation will be conducted after the end of the implementation period to evaluate program results and impacts.

F. RISK ASSESSMENT AND MANAGEMENT

F.1. Risk factors and mitigations measures (max. 3 pages)

Selected Risk Factor 1: Credit default risk

Category	Category	Category
Credit	Credit	Credit

Description

Inability of lender to service debt.

Mitigation Measure(s)

All loans from the program will be aligned with IDB loans. As such the credit or loan default risk on repayment of program loans is low. To further ensure that underlying projects of the Program are financially sustainable themselves and don't create a further burden on the lender, all economic and financial analyses of each project (with exception of hydrogen and V2G pilot projects) shall be conducted in accordance with IDB's Guidelines for the Economic Analysis of Projects. The Program explicitly focus on developing financially bankable models at the project level itself.

Selected Risk Factor 2: EV technology risk

Category	Category	Category
Technical and operational	Technical and operational	Technical and operational

Description

EVs do not perform as expected and the operator cannot realize standard operations.

Mitigation Measure(s)

IDB's comprehensive technical design and structuring of projects minimize this risk. All technologies have been proven at least in pilot cases in other countries.

Selected Risk Factor 3: Lack of alignment of ESS

Category	Category	Category
Technical and operational	Technical and operational	Technical and operational

Description

Beneficiaries' failure to comply with national regulations and/or IDB and GCF environmental, social policy, gender requirements and compliance with standards, policies and procedures.

Mitigation Measure(s)

All projects shall be prepared and implemented in compliance with IDB's Safeguard Policy Statement, which may be updated from time to time. Each Project will be appropriately appraised and structured to meet IDB's and GCF's requirements. Environmental, Social and Gender Action Plans will be developed as part of the due diligence process during project appraisal and preparation to achieve this. Implementation of such safeguards requirements will be covenanted through financing agreements, monitored by IDB.

Selected Risk Factor 4: Design risk

Category	Category	Category
Other	Other	Other

Description

Limited capacity or experience to design and implement e-mobility projects by beneficiaries.

Mitigation Measure(s)

Technical assistance will focus on supporting entities to identify, design and structure e-mobility projects. Detailed legal and technical due diligence will be carried out by the IDB to develop robust projects. Support will be provided under the Program to assist in developing favourable policies for deployment of e-mobilities.

Selected Risk Factor 5: Illicit practices

Category	Category	Category
Prohibited practices	Prohibited practices	Prohibited practices

Description
Risk of projects being involved in illicit practices (money laundering, terrorist financing or other prohibited practices).
Mitigation Measure(s)
GCF financing will be provided as loans or grants to sovereign and sovereign-backed entities. As GCF funds will be provided alongside co-financing from IDB, IDB Integrity Principles and associated due diligence will apply at project level, which will also mitigate this risk. All projects shall comply with IDB's Anticorruption Policy and acknowledge that IDB reserves the right to investigate directly, or through its agents, any alleged corrupt, fraudulent, collusive or coercive practice relating to the projects; and recipients of the grant/loan shall cooperate with any such investigation and extend all necessary assistance for satisfactory completion of such investigation. As per IDB policies and procedures, prior to the approval of each specific project, IDB's fiduciary team will perform and/or update an institutional capacity assessment on the corresponding EE. This assessment includes overall technical capacity, adequacy of information systems, internal and external controls, and recommendations on any fiduciary risks identified. The Office of Institutional Integrity of the IDB (OII) plays a key role in the IDB's integrity efforts. OII is an independent office responsible for the prevention and investigation of prohibited practices, including fraud, corruption and misappropriation of funds, in all activities financed by the IDB. OII's investigative team is responsible for conducting investigations and for the submission of administrative charges to the Sanctions System against parties involved in Prohibited Practices. OII follows the Principles and Guidelines for Investigations, incorporated in the Uniform Framework for Preventing and Combating Fraud and Corruption adopted by the International Financial Institutions Anti-Corruption Task Force. OII has different channels to report allegations of prohibited practices, including an independent reporting hotline available 24/7 and an online form to report allegations of prohibited practices. In addition, OII's preventive team provides advisory services to project teams to identify, assess and mitigate integrity risks and their related reputational impact throughout the lifecycle of a project, including when an allegation is received, and operational measures need to be taken. As part of its preventive activities, OII carries out trainings for different organizational units, including country offices, to reinforce employees' awareness of the IDB's integrity framework and of managing integrity risk in IDB-financed operations, executing agencies, and other external stakeholders. Internally, the Office of Ethics of the IDB investigates ethical violations by Bank staff and ensures compliance with financial disclosure requirements, including completion of the annual declaration of interests or affidavit form by all IDB staff. The Office of Ethics also investigates allegations of prohibited practices by IDB staff, such as theft, workplace fraud, and abuse of authority. The IDB has strong mechanisms to protect whistleblowers. The IDB's Whistleblower Policy was approved by the Board of Directors of the IDB in 2011 and further strengthened in 2012. The IDB's policy for whistleblower protection expressly prohibits acts of retaliation against IDB employees and external parties that report allegations of Prohibited Practices or cooperate with Bank authorities in investigations, audits, or other inquiries. This policy also establishes the measures the IDB will take to prevent retaliation against employees and external parties that make a report. None of the project activities will be undertaken in any jurisdiction which is subject to or affected by United Nations Security Council. The IDB Project Procurement Policies that will regulate the procurement activities of the program establishes that firms of a country or goods manufactured in a country may be excluded if by an act of compliance with a decision of the United Nations Security Council taken under Chapter VII of the Charter of the United Nations,

the Borrower's country prohibits any import of goods from, or payments to, a particular country, person, or entity. Where the Borrower's country prohibits payments to a particular firm or for particular goods by such an act of compliance, that firm may be excluded. Notwithstanding, the current sanctions to countries and the nationalities of the individuals sanctioned are not eligible to participate as bidders in IDB financed activities as per the Bank's country eligibility requirements.

Selected Risk Factor 7: Procurement

Category	Category	Category
Technical and operational	Technical and operational	Technical and operational
Description		
Lack of compliance with procurement rules and / or limited capacity in procurement issues.		
Mitigation Measure(s)		
All procurement to be financed under the program must be carried out in accordance with IDB's procurement policy and regulations. As required, and on a project-by-project basis, IDB will support procurement processes and offer procurement training. Procurement risks, procurement capacity assessment and market analysis will be carried out in accordance with the IDB Guidance on Procurement Risk Framework. Procurement will be undertaken in accordance with the IDB Procurement Guidelines. All consultants will be engaged following the IDB Guidelines on the Use of Consultants.		

Selected Risk Factor 8: Forex

Category	Category	Category
Forex	Forex	Forex
Description		
Volatile local currencies versus the USD loans from the Program create financial viability stresses on underlying projects.		
Mitigation Measure(s)		
All lending from the Program and IDB will be assessed for financial risks in project specific financial models which include local currency to USD likely long-term swap rates. This should provide adequate comfort that project financials are able to cope with any future currency volatility. In addition in most sovereign loan projects, the sovereign government assumes currency risks before passing on loans to projects in local currency. This also provides adequate comfort on this risk, with sovereigns better able to match currency outflows and inflows.		

Selected Risk Factor 9: Co-financing

Probability	Probability	Probability
Low	Low	Low
Description		
Co-financing from IDB or the national part does not materialize.		
Mitigation Measure(s)		
IDB co-financing will be identified for every project due to a) projects being selected through IDB's country policy dialogue with developing member countries to determine IDB's funding allocations on selected priority projects to be agreed between IDB and the countries; b) sub-project eligibility criteria requiring minimum co-financing shares from IDB and/or national / other parties.		

G. GCF POLICIES AND STANDARDS

G.1. Environmental and social risk assessment (max. 750 words, approximately 1.5 pages)

IDB's Safeguard Policy (SP) is a consolidated policy covering environment, involuntary resettlement, and indigenous peoples. All projects will be prepared in accordance with the SP requirements. All projects undergo environmental and social due diligence at appraisal to help IDB decide if the project should be financed and, if so, the way in which environmental and social risks and impacts should be addressed in its planning, implementation and operation. The appraisal process also identifies opportunities for additional environmental or social benefits. IDB seeks that projects are designed, implemented, and monitored in compliance with its policies, applicable regulatory requirements and international best practices. The SP sets out principles, rules, procedures and guidelines for conducting environmental and social due diligence of the potential projects. These procedures and guidelines also describe the process for developing measures to avoid and mitigate potential adverse impacts as well as opportunities to improve the environmental and social outcomes of the projects.

IDB is committed to the principles of transparency, accountability and stakeholder engagement, and promoting adoption and implementation of these principles by its clients. Proportionate to the nature and scale and environmental and social risks and impacts of the project, IDB requires its clients to disclose sufficient information about the risks and impacts arising from projects, engage with stakeholders in a meaningful, effective, inclusive and culturally appropriate manner and take into consideration the feedback provided through such engagement.

Each project under the Program will require a Stakeholder Engagement Plan, including a grievance mechanism. IDB will disclose on its website appropriate information on environment and social safeguards aspects and due diligence for each project under the Program.

IDB works very closely with governments, authorities and civil society, to uphold the principle of country ownership via direct partnerships (regional offices); via IDB's Resident Mission offices in the field and via the country and sector strategies (energy and transport as relevant sectors for this Program) that are developed jointly with the country and in consultation with stakeholders including amongst others the energy sector, electric utilities, the transport sector, private and public transport operators, universities, FIs, involved donors and NGOs. Previous to the realization of this FP, IDB has undertaken extensive dialogues and discussions on intervention options with the selected developing member countries and with relevant stakeholders. IDB has also discussed the Program, key interventions, program components, program financing and the project pipeline with the GCF focal points and relevant staff in all involved countries.

G.2. Gender assessment and action plan (max. 500 words, approximately 1 page)

A gender assessment has been realized for all countries as well as a gender action plan. This serves as guideline for each individual project to be funded under the Program and as a framework to develop a gender approach for the Program (see Annex 8).

The outlook to both keeping the progress and continue reducing the gaps in gender equality is challenging after the COVID-19 pandemic. UN Women and other international organizations fear that recent gains in gender equality might be lost. The COVID-19 pandemic has worsened women's situation and has aggravated differences amongst groups. Gender based violence has increased and women in lockdowns are living with their aggressor under the same roof and can't access support networks. As example in Colombia the calls to the domestic violence helpline increased by 91%; adding to that, figures of actual gender-based violence are worse during COVID-19 because the fear of getting infected prevents women from seeking help in health services.[93]. Many women have abandoned the labor market to lead their household's dynamics during the pandemic, with severe lockdowns in most countries in the region and schools and workplaces closed, while access to decent work has deteriorated for all.

According to UN Habitat, two-thirds of the population will be living in cities by 2050 (UN Habitat, 2018). Together with pollution, overcrowding, lack of modal integration, are some of the problems that the increase of urban population is exacerbating. Lack of access to transportation and safety issues limits women's participation in the labor market and

[93] Gender dimensions of the COVID-19 Pandemic, WB April 2020

reduces their participation in the economy by 16.5%[94]. Women turn away working opportunities depending on the traveling conditions to the work station (time spent, return timing, expenses). Besides providing access to education, health and jobs, the sector generates jobs itself but traditionally most opportunities are likely to remain in men's hands. Hence, when we use gender lens to analyze urban transportation, we discover that the conditions, priorities, and beliefs about urban transport infrastructure and services vary between women and men and, consequently, the decisions that they make about mobility are shaped by these conditions, priorities and beliefs. The lack of certain safety features in the design of the transport system can constrain a woman's decision to choose a certain mode of transportation, sometimes in ways that are inoculate to men, such as dark bus stops or overcrowded buses. When it comes to the design of the transport infrastructures, the realities of women, the elderly and people with disabilities are many times alike and need be taken into account when designing a transport operation. There is myriad of links between gender and urban transportation. There are gender differences in the purpose, time, mode of transportation, or perceptions on safety, that affect women's mobility agency and access to economic opportunities, and the differences comprised in this section are shared among the countries in the region.

The investments projects of the Program need to include a gender strategy with actions to increase women's mobility, promote safety and access to jobs. This Program can improve women's agency in mobility if mainstreaming gender equality in its projects becomes systematic. Gender-based violence is endemic in these countries and underreported; the COVID-19 pandemic is exacerbating the numbers. The urban transport system represents an environment where harassment and sexual abuses occur quotidianly in the regular trips women do every day. Incidents will happen in the e-buses, in the e-taxis, while waiting, walking to and from the stops or using charging stations; incidents will increase at night, in isolated vehicles and unattended places, but in crowded units as well. Women are not represented in the jobs generated by the construction and transport sector in the region. The pandemic complicates the return to work for those women who lost their jobs and those whose care responsibilities have increased; the Program is an opportunity for women in these eight countries to access the new jobs that will be generated. The investment projects for e-taxis adoption must learn from the segregated ride-hailing market which is growing in the region, and adapt to vulnerable groups without access to technology.

The Gender Action Plan guarantees that these general recommendations are transformed into specific activities at the Program and project levels, and that they are measured and adequately monitored, and adjusted when needed.

G.3. Financial management and procurement (max. 500 words, approximately 1 page)

Financial resources from the GCF will be managed according to the general provisions of the AMA. IDB has thus established the GCF Trust Fund ('GCF Account') internally, through which all GCF resources under this Program will be transferred to the GCF Account, based on the forecast of expected approval and disbursement requests of sub-projects. Based on such sub-project disbursement requests, the IDB will request, for each underlying transaction, the commitment of GCF resources to behold in the GCF Account to a specific sub-project.

The financial management and oversight of any of the above-mentioned operations, including reporting requirements, would follow IDB policies and procedures, and applicable AMA and FAA requirements, which would be reflected as needed in any Subsidiary Agreements. The Subsidiary Agreements would require that use of GCF resources be for eligible activities under the applicable components of the Program, would establish the disbursement period and will establish other implementation requirements, including regarding the executing structure of GCF funded activities within the EE.

The disbursements, reporting (including external audit reports), monitoring, and evaluation of the Project will be done in accordance with IDB Policies and Procedures, among others the IDB's Financial Management Guidelines (OP-273-6) and reflected in the Term Sheet and FAA.

Disbursement of GCF resources to the IDB under the FAA would be subject to the IDB having approved the allocation of Program resources to individual reimbursable (sovereign guaranteed loans) or non-reimbursable (technical cooperation assistance and investment grants) operations and following the effectiveness of the corresponding Subsidiary Agreements for such individual operations, if such agreements are needed.

[94] World Employment and Social Outlook: Trends for women 2017. International Labour Office – Geneva: ILO, 2017

Loan resources will be disbursed to the corresponding EE as an advance of funds or as reimbursement of expenses at any time within the established loan disbursement period, in accordance with IDB policies. Proceeds disbursed as reimbursement of expenses that were already made by the EE in accordance with the terms of the Subsidiary Agreement may then be freely used by the EE in accordance with its mandate and for purposes that may be unrelated to the corresponding Sub-Project.

EEs will be required to submit audited financial statements within 120 days after the closing of each fiscal year throughout the execution period, as per standard IDB practice. Financial statements shall be duly audited by an independent firm acceptable to the IDB and in compliance with local regulation. EEs are also required to prepare and submit periodical reports (at least annually) including financial information and compliance with eligibility criteria for sub-loans, as well as progress with regards to the development objectives based on a set of predefined results indicators. These reports will provide the inputs for the APRs the IDB will have to deliver for the GCF according to the AMA.

When acting as EE, IDB would apply its own policies for hiring of individual consultants and/or procurement of consulting and other services and would require other EEs to use applicable IDB's procurement policies for their use of GCF resources.

In accordance with the AMA, the GCF Account will be subject to an external audit requirement. No later than June 30 of each year, the IDB will deliver to the GCF an assertion report by the IDB management and a report by the Bank's external auditors, on the effectiveness of internal controls and on the accuracy of the combined financial statements of all trust funds under the IDB's administration with an external audit requirement, including the Fund, together with the combined financial statements of all trust funds for the previous calendar year. Such audited financial statements are prepared in accordance with the IDB's existing policies and accounting standards for trust funds' financial reporting, as updated from time to time. The cost of such audits will be deducted from the resources of the Fund.

G.4. Disclosure of funding proposal

Note: The Information Disclosure Policy (IDP) provides that the GCF will apply a presumption in favour of disclosure for all information and documents relating to the GCF and its funding activities. Under the IDP, project and programme funding proposals will be disclosed on the GCF website, simultaneous with the submission to the Board, subject to the redaction of any information that may not be disclosed pursuant to the IDP. Information provided in confidence is one of the exceptions, but this exception should not be applied broadly to an entire document if the document contains specific, segregable portions that can be disclosed without prejudice or harm.

Indicate below whether or not the funding proposal includes confidential information.

☒ No confidential information: The accredited entity confirms that the funding proposal, including its annexes[95], may be disclosed in full by the GCF, as no information is being provided in confidence.

☐ With confidential information: The accredited entity declares that the funding proposal, including its annexes, may not be disclosed in full by the GCF, as certain information is being provided in confidence. Accordingly, the accredited entity is providing to the Secretariat the following two copies of the funding proposal, including all annexes:

- full copy for internal use of the GCF in which the confidential portions are marked accordingly, together with an explanatory note regarding the said portions and the corresponding reason for confidentiality under the accredited entity's disclosure policy, and
- redacted copy for disclosure on the GCF website.

[95] **Funding Proposal is public. List of confidential annexes is included in the Disclosure Form - Funding proposal annexes**

The funding proposal can only be processed upon receipt of the two copies above, if containing confidential information.

H. ANNEXES

H.1. Mandatory annexes

☒	Annex 1	NDA no-objection letter(s) **(template provided)**
☒	Annex 2	Feasibility study - and a market study, if applicable
	Annex 2b	Rationale for adaptation
	Annex 2c	Summary hydrogen project Paraguay
	Annex 2d	Summary electric vessel project Cartagena
☒	Annex 3	Economic and/or financial analyses in spreadsheet format
☒	Annex 4	Detailed budget plan **(template provided)**
☒	Annex 5	Implementation timetable including key project/programme milestones **(template provided)**
☒	Annex 6	E&S document corresponding to the E&S category (A, B or C; or I1, I2 or I3): **(ESS disclosure form provided)** ☐ Environmental and Social Impact Assessment (ESIA) or ☐ Environmental and Social Management Plan (ESMP) or ☐ Environmental and Social Management System (ESMS) ☐ Others (please specify – e.g. Resettlement Action Plan, Resettlement Policy Framework, Indigenous People's Plan, Land Acquisition Plan, etc.)
☒	Annex 7	Summary of consultations and stakeholder engagement plan
☒	Annex 8	Gender assessment and project/programme-level action plan **(template provided)**
☒	Annex 9	Legal due diligence (regulation, taxation and insurance)
☒	Annex 10	Procurement plan **(template provided)**
☒	Annex 11	Monitoring and evaluation plan **(template provided)**
	Annex 11b	Monitoring manual
☒	Annex 12	AE fee request **(template provided)**
☐	Annex 13	Co-financing commitment letter, if applicable **(template provided)**
☒	Annex 14	Term sheet including a detailed disbursement schedule and, if applicable, repayment schedule

H.2. Other annexes as applicable

☐	Annex 15	Evidence of internal approval **(template provided)**
☒	Annex 16	Map(s) indicating the location of proposed interventions
☒	Annex 17	Multi-country project/programme information **(template provided)**
☐	Annex 18	Appraisal, due diligence or evaluation report for proposals based on up-scaling or replicating a pilot project
☐	Annex 19	Procedures for controlling procurement by third parties or executing entities undertaking projects financed by the entity
☒	Annex 20	First level AML/CFT (KYC) assessment
☒	Annex 21	Operations manual (Operations and maintenance)

☒	Annex 22a	Assessment of GHG emission reductions and their monitoring and reporting (for mitigation and cross cutting-projects)[96]
	Annex 22b	GHG calculations
	Annex 22c	Total investment pipeline projects
☒		

** Please note that a funding proposal will be considered complete only upon receipt of all the applicable supporting documents.*

[96] Annex 22 is mandatory for mitigation and cross-cutting projects.