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| ***Note to accredited entities on the use of the funding proposal template*** |  |  |  |
| * Sections **A, B, D, E** and **H** of the funding proposal require detailed inputs from the accredited entity. For all other sections, including the Appraisal Summary in section F, accredited entities have discretion in how they wish to present the information. Accredited entities can either directly incorporate information into this proposal, or provide summary information in the proposal with cross-reference to other project documents such as project appraisal document.
* The total number of pages for the funding proposal (excluding annexes) is expected not to exceed 50.
 |

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“[FP]-[Agency Short Name]-[Date]-[Serial Number]”

FP-UNDP-290715-5681

|  |
| --- |
| A.1. **Brief Project / Programme Information** |
| **A.1.1. Project / programme title** | **Accelerating the transformational shift to a low-carbon economy in the Republic of Mauritius** |
| A.1.2. Project or programme | programme |
| **A.1.3. Country (ies) / region**  | **Republic of Mauritius** |
| **A.1.4. National designated authority (ies)** | **Ministry of Finance and Economic Development** |
| **A.1.5. Accredited entity** | **United Nations Development Programme** |
| A.1.5.a. Access modality | [ ]  Direct ☒ International |
| A.1.6. Executing entity / beneficiary | Executing Entity: Ministry of Finance and Economic DevelopmentEntities with delegated execution responsibilities:* Component 1: Ministry of Energy and Public Utilities
* Component 2: Central Electricity Board
* Component 3: Outer Islands Development Corporation
* Component 4: Ministry of Public Infrastructure and Land Transport / National Transport Authority

Beneficiary:* 129,500 households (one-third of Mauritian households) with improved access to low-emission sources of electricity
* 100,000 passengers per day (14% of the public transport user-base) benefiting from new fuel-efficient hybrid buses
 |
| A.1.7. Project size category (Total investment, million USD) | ☐ Micro (≤10)☒ Medium (50<x≤250)  | ☐ Small (10<x≤50) ☐ Large (>250) |
|
| A.1.8. Mitigation / adaptation focus | [x]  Mitigation [ ]  Adaptation [ ]  Cross-cutting |
| A.1.9. Date of submission | 30 July 2015 |
| A.1.10.Project contact details | Contact person, position | Mr Robert KellyRegional Technical Advisor, Africa |
| Organization | United Nations Development Programme  |
| Email address | robert.kelly@undp.org |
| Telephone number | +251 91250 3306 |
| Mailing address | UNDP – Global Environment Finance,UNDP Regional Service Centre,Main Bole Road, Olympia,P.O. Box 60130,Addis Ababa, Ethiopia. |
|  |  |  |
| A.1.11. Results areas *(mark all that apply)*  |
|
| Reduced emissions from: |
| [x]  | Energy access and power generation (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)  |
| [x]  | Low emission transport (E.g. on-grid, micro-grid or off-grid solar, wind, geothermal, etc.)  |
| [ ]  | Buildings, cities and industries and appliances (E.g. new and retrofitted energy-efficient buildings, energy-efficient equipment for companies and supply chain management, etc.)  |
| [ ]  | Forestry and land use (E.g. forest conservation and management, agroforestry, agricultural irrigation, water treatment and management, etc.) |
|  |
| Increased resilience of: |
| [ ]  | Most vulnerable people and communities(E.g. mitigation of operational risk associated with climate change – diversification of supply sources and supply chain management, relocation of manufacturing facilities and warehouses, etc.) |
| [ ]  | Health and well-being, and food and water security(E.g. climate-resilient crops, efficient irrigation systems, etc.) |
| [ ]  | Infrastructure and built environment(E.g. sea walls, resilient road networks, etc.)Ecosystem and ecosystem services(E.g. ecosystem conservation and management, ecotourism, etc.) |
| [ ]  |
|  |  |
| A.2. **Project / Programme Executive Summary (max 300 words)** |
| 1. With an energy dependence rate of 84%, Mauritius, like many Small Island Developing States, is extremely vulnerable to energy shocks. The grid emission factor of Mauritius is extremely high at 1.01 tonnes CO2/MWh due to the prevalence of imported coal (43%) and fuel oil (37%) in the electricity generation mix. Net greenhouse gas emissions are increasing at a rapid rate of 3% per year. The pressing need to significantly enhance Mauritius’s energy independence and reduce greenhouse gas emissions is recognised in the country’s Second National Communication to the UNFCCC (2010) and its UNFCCC Technology Needs Assessment (2014), as well as in a comprehensive suite of Government strategies and policies contained in the Long-Term Energy Strategy (2011-2025).

 1. Following a broad consultative process led by the NDA and backed by sound technical and financial analysis as well as considerable political will, this programme will remove the principal bottlenecks to investment in low-carbon development for: (i) grid-connected intermittent renewable energy; (ii) mini-grid PV for the principal outer island, Agalega; and (iii) switching the country’s bus fleet away from diesel. The programme will be implemented in a two-phase approach so as to reduce the upfront demands on GCF resources and ensure that the second funding disbursement is contingent upon successful completion of the first phase.

 1. The first phase of the programme seeks US$ 18.1 million of GCF grant resources to overcome identified barriers to low-carbon investment. The incremental logic of the programme and its requirement for grant resources are clearly laid out in the proposal. Overall, the programme will result in a reduction in greenhouse gas emissions of 4.19 million tCO2e over the lifetimes of the investments enabled, at a cost to the GCF of just US$ 10.74/tCO2e.
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|  |
| --- |
| A.3. **Project/Programme Milestone** |
| Expected approval from accredited entity’s Board (if applicable) | Date: 16/07/2015 |
| Expected financial close (if applicable) |  |
| Estimated implementation start and end date | Start: 01/01/2016End: 31/12/2023 |
| Project/programme lifespan | 8 years |

|  |
| --- |
| **B.1. Description of Financial Elements of the Project / Programme** |
| 1. The programme consists of 4 inter-related components:
* Component 1: Institutional strengthening for renewable energy
* Component 2: Grid strengthening and PV deployment
* Component 3: PV mini-grids on the Outer Island of Agalega
* Component 4: Energy-efficient public transport
1. The programme will be implemented in two phases so that funds can be disbursed in a logical and appropriate manner without burdening the GCF or the executing entities. Phase 1 will be implemented between 2016-2018; Phase 2 will be implemented between 2019-2023.
2. Under Phase 1 (2016-2018), the following components will be executed:
* Component 1: Institutional strengthening for renewable energy (GCF finance: US$ 1.1 million; co-finance: US$ 1.08 million)
* Component 2, Phase 1: Grid Strengthening and PV deployment (GCF finance: US$ 10 million; co-finance: US$ 20 million)
* Component 4, Phase 1: Energy-efficient public transport (GCF finance: US$ 7 million; co-finance: US$ 13.27 million)
1. Under Phase 2 (2019-2023), the following components will be executed:
* Component 2, Phase 2: Grid Strengthening and PV deployment (GCF finance: US$ 19 million; co-finance: US$ 140.4 million)
* Component 3: PV mini-grids on the Outer Island of Agalega (GCF finance: US$ 0.9 million; co-finance: US$ 1.2 million)
* Component 4, Phase 2: Energy-efficient public transport (GCF finance: US$ 7 million; co-finance: US$ 12.86 million)
1. A detailed description of the programme design and phasing is provided in Section C.3.
2. The total GCF grant resources sought for the overall programme are US$ 45 million: $18.1 million for Phase 1 and $26.9 million for Phase 2. The programme will leverage considerable co-finance – US$ 188.81 million – from the public and private sectors. The breakdown of GCF and co-finance resources across the phases is presented in Table 1 below:

*Table 1. Breakdown of GCF Finance and Co-Finance Across the Phases*

|  |  |  |  |
| --- | --- | --- | --- |
| **Phase** | **Duration** | **GCF Grant Finance** | **Co-Finance** |
| Phase 1 | 3 years | US$ 18.1 million | US$ 34.35 million |
| Phase 2 | 5 years | US$ 26.9 million | US$ 154.46 million |

1. GCF resources for Phase 2 of the programme will only be released upon successful completion of Phase 1. Therefore, the initial grant funding being requested from the GCF is US$ 18.1 million.
2. The breakdown of GCF finance and co-finance across the components and sub-components is presented in Table 2 below. Note that this breakdown is inclusive of project management costs and agency fees.

*Table 2: Breakdown of GCF Finance and Co-Finance Across the Components and Sub-Components[[1]](#footnote-1)*

|  |  |  |  |
| --- | --- | --- | --- |
| **Component** | **Sub-component(if applicable)** | **GCF Financing(US$ millions)** | **Co-Financing** |
| **Source**  | **Amount(US$ millions)** |
| 1. Institutional strengthening for renewable energy | 1.1 Institutional strengthening of MARENA | 1.0 | Government of Mauritius (MEPU) | 0.9 |
| UNDP | 0.07 |
| 1.2 Assistance to GCF accreditation for CEB and MEPU | 0.1 | Government of Mauritius (MEPU) | 0.1 |
| UNDP | 0.01 |
| 2. Grid strengthening and PV deployment | 2.1 Grid strengthened to accept 185 MW of intermittent RE | 12.0 | UNDP | 1 |
|  CEB | 2 |
| AFD | 17 |
| 2.2 Smart grid | 3.0 |  CEB | 1 |
| AFD  | 1.7 |
| 2.3 Support to PV deployment | 14.0 | CEB | 119 |
| AFD | 18.7 |
| **3.** PV mini-grids on the outer island of Agalega | 3.1 PV mini-grids on the Outer Island of Agalega | 0.9 | Government of Mauritius (OIDC) | 0.9 |
| UNDP | 0.3 |
| 4. Energy-efficient public transport | 4.1 Integrating fuel efficiency in the Bus Modernisation Programme | 12.5 | AFD | 6.9 |
| Private bus companies | 11.63 |
| Government of Mauritius (Build Mauritius Fund) | 5 |
| 4.2 Supporting the deployment of the Smart Bus Information System | 1.5 | Private bus companies | 2.2 |
| UNDP | 0.4 |
| **Total** | **45** |  | **188.81** |

1. The breakdown of GCF finance across the components and sub-components in local currency is presented in Table 3 below.

*Table 3: Breakdown of GCF Cost Estimates in US$ and in Local Currency*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Component** | **Sub-component(if applicable)** | **Amount** | **Currency of disbursement** | **Amount** | **Local currency(Mauritius Rupee)[[2]](#footnote-2)** |
| 1. Institutional strengthening for renewable energy | 1.1 Institutional strengthening of the MARENA | 1.0 | million USD ($) | 35,230,000 | MUR |
| 1.2: Assistance to GCF accreditation for CEB and MEPU | 0.1 | million USD ($) | 3,523,000 | MUR |
| 2. Grid strengthening and PV deployment | 2.1 Grid strengthened to accept 185 MW of intermittent RE | 12.0 | million USD ($) | 422,760,000 | MUR |
| 2.2 Smart grid  | 3.0 | million USD ($) | 105,690,000 | MUR |
| 2.3 Support to PV deployment  | 14.0 | million USD ($) | 493,220,000 | MUR |
| **3.** PV mini-grids on the Outer Island of Agalega | 3.1 PV mini-grids on the Outer Island of Agalega | 0.9 | million USD ($) | 31,707,000 | MUR |
| 4. Energy-efficient public transport | 4.1 Integrating fuel efficiency in the Bus Modernisation Programme | 12.5 | million USD ($) | 440,375,000 | MUR |
| 4.2 Supporting the deployment of the Smart Bus Information System | 1.5 | million USD ($) | 52,845,000 | MUR |
| **Total** | **45** | **million USD ($)** | **1,585,350,000** | **MUR** |

1. UNDP’s currency hedging mechanism is based on matching cash flows (i.e. revenues and expenses) in non-US$ currencies and bank account balances are targeted not to exceed approximately one month’s disbursement requirements to minimise risk.
2. Detailed financial analysis of the programme is given in Annex III and in Section F.1.
 |
| **B.2. Project Financing Information** |
|  | **Financial Instrument** | **Amount** | **Currency** | **Tenor** | **Pricing** |
| **(a) Total project financing** | **(a) = (b) + (c)** | 233.81 | million USD ($) |  |
| (b) Requested GCF amount | (i) Senior Loans(ii) Subordinated Loans(iii) Equity(iv) Guarantees(v) Reimbursable grants \*(vi) Grants \* | ……………………………………………………………………………………………45 | OptionsOptionsOptionsOptionsOptionsmillion USD ($) | ( ) years( ) years | ( ) % ( ) % ( ) % IRR |
| *\* Please provide economic and financial justification in* [*section F.1*](#SectionF) *for the concessionality that GCF is expected to provide, particularly in the case of grants. Please specify difference in tenor and price between GCF financing and that of accredited entities. Please note that the level of concessionality should correspond to the level of the project/programme’s expected performance against the investment criteria indicated in* [*section E*](#SectionE)*.* |
| Total requested(i+ii+iii+iv+v+vi) | 45 | million USD ($) |  |
| (c) Co-financing | **Financial Instrument** | **Amount** | **Currency** | **Name of Institution** | **Tenor** | **Pricing** | **Seniority** |
| Senior Loans | 44.3 | Million USD ($) | AFD | 20 years | 2.86% or 6% including cost of hedging against foreign currency risk | Senior |
| Grant | 128.9 | Million USD ($) | Government of Mauritius (including CEB) |  |  |  |
| Grant | 1.78 | Million USD ($) | UNDP |  |  |  |
| Equity | 13.83 | Million USD ($) | Bus companies |  |  |  |
| Lead financing institution: Agence Française de Développement (AFD) |
| *\* Please provide a confirmation letter or a letter of commitment in section I issued by the co-financing institution.*Co-finance letters are attached to this proposal in Annex IV. |
| **B.3. Fee Arrangement** |
| 1. A fee of 10% is applied to cover quality assurance and oversight services performed by UNDP over all phases of the project cycle as follows: (i) oversight of proposal development; (ii) appraisal (pre and final) and oversight of project start-up; (iii) supervision and oversight of project implementation; and (iv) oversee project closure.
2. With total GCF funding requested at a level of US$ 45 million, the fee will be US$ 4.09 million in total for the entire programme.
 |
| **B.4. Financial Market Overview (if applicable)** |
|  1. Not applicable.
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| Please fill out applicable sub-sections and provide additional information if necessary, as these requirements may vary depending on the nature of the project / programme. |
| **C.1. Strategic Context** |
| 1. The Republic of Mauritius is an island nation off the southeast coast of the African continent in the southwest Indian Ocean, approximately 900 km (560 mi) east of Madagascar. In addition to the island of Mauritius, the Republic includes the islands of Cargados Carajos, Rodrigues and the Agalega Islands, totalling a population of 1.3 million inhabitants.
2. Mauritius is heavily reliant on fossil fuels to power its economy. The grid emission factor of Mauritius is an extremely high 1.01 tonnes CO2/MWh[[3]](#footnote-3) due to the prevalence of imported coal (43%) and fuel oil (37%) in the electricity generation mix.[[4]](#footnote-4) Even relatively modest measures to reduce fossil fuel use therefore have the potential to significantly enhance Mauritius’s energy independence and reduce greenhouse gas emissions. This fact is recognised by the Government, which has embarked on a national strategy to reduce the country’s dependence on fossil fuels – not only for energy security and climate change mitigation purposes but also to improve the country’s deteriorating balance of payments.[[5]](#footnote-5) In this context, the Government has recently cancelled the planned construction of a 110 MW coal-fired power plant.[[6]](#footnote-6)
3. The Second National Communication to the UNFCCC (2010)[[7]](#footnote-7) notes that Mauritius’s overall greenhouse gas (GHG) emissions are growing by 3% per year, and those from the energy and transport sectors specifically by 5.4% and 3.3% per year, respectively. Together, the energy and transport sectors account for 86% of Mauritius’s total greenhouse gas (GHG) emissions of 3.8 MtCO2e. As identified by the country’s UNFCCC Technology Needs Assessment (2012)[[8]](#footnote-8), solar energy and energy efficiency offer significant potential, particularly as the country’s major current source of renewable energy – bagasse, which accounts for 16% of Mauritian electricity generation and 80% of renewable electricity generation – is intrinsically unscalable (due to land constraints and its seasonal availability).

*Components 1 to 3* 1. The Government’s drive to reduce fossil fuel use is reflected in the Long-Term Energy Strategy 2009-2025[[9]](#footnote-9). Under this Strategy, the Government has recently announced two key targets[[10]](#footnote-10):
* A renewable energy (RE) target of at least 35% of electricity production by 2025.
* The establishment of a dedicated Renewable Energy Agency to coordinate the rapid intake of renewable energy.
1. To facilitate the achievement of these targets, the support of local, regional and international institutions is being actively sought.[[11]](#footnote-11)
2. The Government Action Plan (2015-2019)[[12]](#footnote-12) provides the framework in which national strategies, including the Long-Term Energy Strategy 2009-2025, will be realised. A number of actions are under implementation under the Action Plan:
* In 2010, the Government of Mauritius launched, with UNDP support, the Small-Scale Distributed Generation (SSDG) scheme[[13]](#footnote-13), which has assisted 237 households, schools and public institutions to install small-scale (< 50 kW) photovoltaic (PV) panels and wind turbines through the provision of a targeted feed-in tariff scheme. Such was the success of the scheme that its 2 MW capacity cap was reached in less than one year of the scheme starting, and subsequent extension of the scheme led to an additional 0.94 MW being added within 12 months. The Government has, in its latest Budget[[14]](#footnote-14), stated its desire to scale-up the scheme to encompass an additional ~2,000 households and ~1,000 larger institutions. However, there is a need to significantly strengthen the absorption capacity of the national grid before additional intermittent renewable energy can be connected.
* With regard to the outer islands of the Republic of Mauritius, the Outer Islands Development Corporation (OIDC) has long been advocating the use of PV for Agalega[[15]](#footnote-15), as this would have less of an environmental impact than the numerous oil drums that currently litter the island. Agalega, the largest outer island, is the furthest dependency of Mauritius and has not hitherto received the required attention in terms of infrastructural development. In addition, the berthing facilities at Agalega are limited and the transport of oil drums is undertaken by barges, a process that is fraught with risks of oil spillage in the pristine lagoon and capsizing of barges in unfavourable sea conditions. There is no central electricity grid on the two islands that make up Agalega; rather, the three villages in Agalega – containing a total of 300 inhabitants – are each served by diesel-powered mini-grids. Solar PV – as a decentralised, modular technology – represents a particularly attractive solution to reducing Agalega’s dependence on diesel. A number of PV systems were installed by the Ministry of Energy and Public Utilities in 2000 to service the local population: for example, a PV mini-grid in Vingt Cinq, the largest village, supplied communication equipment, administrative buildings and a small dispensary, together with 30 solar-powered street lights (the first street lighting on the island), initially with great success and to popular acclaim (see the technical assessment report in Annex IId). However, underlying barriers to sustainable use of the PV technology, notably lack of training for island-based technicians and the lack of a systematic sourcing mechanism for spare parts, led to regular breakdowns and ultimately mothballing of the systems in 2009. Building local technical capacity, as well as reinstating and enhancing the current PV systems, remains a key priority for OIDC.
1. Components 1-3 will enable Mauritius to fully meet its stated targets in terms of renewable energy production and will give credence to the Government’s stated objective of making Mauritius a Sustainable Island (*Maurice Ile Durable*).[[16]](#footnote-16)

*Component 4* 1. Buses are the principal form of public transport in Mauritius and account for 7% of the country’s entire vehicle fleet. Over 60% of the population uses buses at least once a week, with most passengers using them daily for commuting purposes. The bus fleet travels 137.9 million km each year. However, as highlighted by the Mauritius Transport Consensus Forums (2006)[[17]](#footnote-17), the bus fleet (consisting of 1,943 buses) is becoming increasingly antiquated and bus operators are struggling to pay for fleet renewal costs. One-third of the bus fleet is over 10 years old and over one-quarter is approaching (or exceeding) 16 years of age. The bus fleet is fuel-inefficient, polluting, uncomfortable and dirty for passengers, and unsuitable for use by the handicapped and elderly.[[18]](#footnote-18)
2. In response, the National Transport Authority (NTA), under the Ministry of Public Infrastructure and Land Transport, has embarked on a Bus Modernisation Programme[[19]](#footnote-19) with the aim of replacing the current buses with semi low-floor models[[20]](#footnote-20) for increased comfort and better access for elderly and disabled passengers. The aim of the Programme is to ensure that, by 2023, 75% of buses are less than 10 years old. The Programme, funded by a Government budget of Rs 300 million (~US$ 8.5 million), offers US$ 28,385 grants and additional tax rebates (15% VAT exemption) to encourage bus owners to make the switch. The Programme has recorded limited success to date, for two reasons: (1) the funds on offer have proven sufficient but conservative for bus companies to invest[[21]](#footnote-21), and (2) the limited number (34) of new semi low-floor buses that have been acquired have proven to have worse fuel efficiency than the old buses being replaced, with the result that the Bus Modernisation Programme is at risk of further undermining the country’s energy security. The Ministry is seeking GCF support to ensure that the Bus Modernisation Programme can be aligned with the Government’s stated objective of reducing the country’s GHG emissions.
 |
| **C.2. Project / Programme Objective against Baseline** |
| *Climate Vulnerability Baseline[[22]](#footnote-22)*1. The impacts of climate variability and extreme weather events are becoming a concern to the Republic of Mauritius, including the Outer Islands of Rodrigues, St Brandon and Agalega. The climate of Mauritius is influenced by large ocean-atmosphere interactions, and the islands are vulnerable to tropical cyclones and extreme weather. The islands of Saint Brandon, Agalega and the Cargados Carajos Shoals are also threatened by sea-level rise.
2. Analyses of temperatures recorded at Mauritius and its Outer Islands show a definite warming trend. Average temperature is rising at the rate of 0.15 °C per decade and has risen by 0.74-1.2 °C when compared with the 1961-1990 long-term mean.[[23]](#footnote-23) At some urban stations the temperature has risen even higher. The temperature of Agalega is rising by 0.62 °C per decade.
3. The Second National Communication to the UNFCCC (2010) states that the electricity sector in Mauritius faces major challenges as a result of a changing climate. In particular, it highlights that air conditioning (AC) is now the main driver of growing peak summer demand for electricity and that warmer temperatures will provoke a spiral effect. Air conditioning currently accounts for 20% of electricity consumption in Mauritius in summer time, and is growing at 5% per year.

*Baseline for Component 1: Institutional Strengthening for Renewable Energy*1. The Ministry of Energy and Public Utilities (MEPU)[[24]](#footnote-24) is responsible for all policies relating to investment in the renewable energy sector. The Central Electricity Board (CEB)[[25]](#footnote-25) is a parastatal entity under the purview of MEPU. CEB is responsible for the generation (in collaboration with Independent Power Producers), transmission and distribution of electricity.
2. The current legal and institutional framework governing the energy sector is characterised by regulatory deficiencies, notably the fact that CEB, the dominant power supplier (accounting for 43% of electricity generation) and sole grid operator, also acts as the sector regulator. Parliament voted to establish an independent regulator seven years ago but the law has never been enacted. In the framework of the Long-Term Energy Strategy 2009-2025 and growing concerns at the projected increases in power that will be necessary in the near-future (implying considerably more fossil fuel imports)[[26]](#footnote-26), the Government has recently reaffirmed its intention to establish the Mauritius Renewable Energy Agency (MARENA). MARENA will initially perform a coordination and investment promotion function with regard to renewables and, in particular, renewable energy Independent Power Producers (IPPs).

 1. Government capacity to establish and operationalise MARENA is limited as MEPU has only a small team of engineers (5 professional staff) responsible for overseeing the energy, water and wastewater sectors. Under a recently-closed UNDP-implemented, GEF-financed project, ‘Removal of Barriers to Energy Efficiency and Energy Conservation in Buildings’[[27]](#footnote-27), assistance was provided to MEPU to establish the Energy Efficiency Management Office (EEMO).[[28]](#footnote-28) EEMO is a highly strategic organisation at the centre of Government EE policy-making. Key achievements of EEMO in the space of its short life (since 2013) have included the development of national guidelines for energy efficiency, voluntary agreements with the private sector and national energy efficiency awareness campaigns. As with any new organisation, there was a need to recruit and train staff, and provide them with the necessary equipment to deliver on EEMO’s mandate. While the process of recruiting staff and putting in place the necessary administrative procedures were carried out by Government, the UNDP-GEF project assisted in providing training, equipment and software. The marked success of this approach has led MEPU to request similar GCF support for the creation and operationalisation of MARENA. In parallel with UNDP’s support to EEMO, Agence Française de Développement (AFD) has been assisting MEPU to develop a National Plan of Action on Energy Efficiency.[[29]](#footnote-29)

*Baseline for Component 2:**Grid Strengthening and PV Deployment*1. The current national grid is not ready to accommodate additional intermittent RE as it has been designed and operated for stable power generation (fossil fuels, bagasse and a limited amount of hydro-power). A grid absorption capacity study[[30]](#footnote-30) developed by CEB in 2014 with UNDP support indicates that grid stability is already a critical concern in the context of the current pipeline of renewable energy projects. The report finds that grid stability concerns can most cost-effectively be addressed through centralised solutions – notably the improvement of existing generation control systems, the implementation of Automatic Generation Control (AGC) infrastructure and the installation of lithium-iron batteries by CEB – combined with grid-edge solutions, notably smart meters installed in end-user facilities (in households, offices, factories, etc.) to manage supply-demand imbalances in real-time. With the introduction of these measures, at a total cost of US$ 35.3 million, the upper limit for grid-connected intermittent renewables can be increased from the current constraining level of 60 MW to a considerably more accommodating 185 MW.
2. CEB budget constraints represent a significant barrier to such grid strengthening. As a non-profit-making parastatal entity operating with socially-oriented electricity tariffs set by Government, CEB’s investment budget is typically limited to approximately US$ 135 million per year.[[31]](#footnote-31) Despite having formally indicated its intention to invest in grid strengthening for intermittent renewables in 2013[[32]](#footnote-32), CEB has not been able to do so. CEB already faces significant medium-term costs – amounting to US$ 514 million – for unrelated investments.[[33]](#footnote-33) Nonetheless, CEB has indicated that, should GCF support be forthcoming, it will specifically borrow from co-financing provided by Agence Française de Développement (AFD) in the context of the GCF programme in order to implement the necessary grid-strengthening measures.
3. Accompanying smart-meters at the grid edge offer the potential to:
* Provide consumers with real-time information on their electricity bills, facilitating better household energy management.
* Provide time-of-use features, whereby consumers can benefit from lower tariffs during off-peak hours.
* Enable load sharing and load management by limiting user consumption.
* Enable automatic connection / disconnection of electricity supply in the event of grid instability.
1. CEB has, over the years, invested heavily to improve its metering system. It has been gradually moving away from the use of electromechanical meters (installed numbers have fallen by 16,000 in the past 8 years) and towards the installation of electronic meters (numbers rose from zero in 2005 to 70,000 by 2013). CEB had already migrated its major customers onto the Automatic Meter Reading (AMR) platform, which is an important step towards the development of an Advanced Metering Infrastructure (AMI). CEB is ultimately aiming to develop a full-fledged AMI so as to modernise the national power system. AMI provides state-of-the-art technology, which consists of smart meters, a communications system and meter data management software. Despite its interest in modernising its metering system, CEB’s Integrated Electricity Plan (2013-2022) notes of smart meter technology that (page 111), “despite its numerous tantalising advantages, the only major barrier to its widespread implementation is the huge implied investment.”[[34]](#footnote-34) Clearly, finance remains a major barrier for grid enhancement. UNDP is currently working with CEB on developing a smart grid roadmap, which will be finalised and validated by national stakeholders in January 2016.
2. The Small-Scale Distributed Generation (SSDG) scheme was capped at 2.94 MW, partly for grid stability reasons but also partly for financial reasons. According to data collected during Phase 1 (the first 2 MW) and Phase 2 (the subsequent 0.94 MW) of the SSDG scheme, the levelised cost of rooftop PV-generated electricity was US$ 0.271/kWh, compared with the levelised cost of residential grid electricity of US$ 0.128/kWh. Moreover, the additional costs of small-scale solar PV are upfront: the US$ 10,000 cost of installation (for a standard 2.5 kW system including PV panels, inverter and meter) is prohibitively expensive for the vast majority of Mauritian households, whose average monthly income is US$ 699.[[35]](#footnote-35) Without additional financial support, the payback time of a 2.5 kW system far exceeded the expected lifetime of the installed equipment, and was hence far too long to attract broad-based interest from the population (see the SSDG Phase 1 financial model in Annex IIc). The solution adopted in Phases 1 and 2 of the SSDG was to provide a feed-in tariff of US$ 0.833/kWh, thereby shortening the effective payback time to 5 years. Since this feed-in tariff was withdrawn in 2012, the rooftop PV market has stagnated. Moreover, CEB analysis of Phases 1 and 2 of the SSDG scheme has since revealed that the beneficiaries of the feed-in tariff were overwhelmingly upper- and upper-middle class households. Although the FiT helped to amortise the cost of investing in PV *over time*, it failed to address the fundamental barrier facing low- and middle-income households, that of *upfront* costs.
3. An additional barrier encountered during SSDG Phases 1 and 2 was the limited capacity within Mauritius to install and maintain small-scale PV systems. Only 15 Small- and Medium-Sized Enterprises (SMEs) had the trained staff and technical skills to be able to install PV systems, leading to a situation where they were overwhelmed by the demand. At times during Phase 1, there were delays of 12 months between a household requesting a PV system and the system being installed. If the market is to become more responsive to consumer demand in the context of a future scaled-up Phase 3 of the SSDG, and if installation costs are to come down, investment in building the capacity of the supply-side will be required.

*Baseline for Component 3: PV Mini-Grid on the Outer Island of Agalega*1. The atoll of Agalega is situated approximately 1,000 km north of Mauritius and comprises two islands (the North and South Islands) covering a total of 2,600 hectares. The Outer Islands Development Corporation (OIDC)[[36]](#footnote-36) is responsible for the management and development of the islands. Agalega consists of three villages: Vingt Cinq (population 200), La Fourche (population 40) and Sainte Rita (population 60). Vingt Cinq and La Fourche are situated on the North Island, whereas Sainte Rita is situated on the South Island. Vingt Cinq has approximately 75 buildings, including houses, public buildings and offices. La Fourche consists of 15 houses and two warehouses. All the material requirements of Agalega are shipped from Mauritius.
2. While Agalega benefits from significant insolation year-round (approximately 2,000 hours per year), its electrical power is currently derived from diesel generators. Agalega consumes approximately 1,100 litres of diesel per day, necessitating replenishments by ship every month. The operation ensuring that Agalega is stocked with sufficient diesel fuel is estimated to cost OIDC US$ 22,000 every month, a significant fraction (10%) of its overall operating budget. The result is a territory that is completely dependent upon imported fossil fuel; is running an expensive energy system that prevents needed energy upgrades to schools, clinics and cold storage; and is generating needless greenhouse gas emissions. Mini-grid infrastructure is in place serving each of the three villages. A number of PV installations capable of servicing public buildings and houses exist but have been mothballed for the past 6 years (see the technical assessment in Annex IId).

*Baseline for Component 4: Energy-Efficient Public Transport*1. Mauritius has a total fleet of 1,943 buses, primarily diesel-fuelled, providing public transport services along 302 routes around the island. One-third of the bus fleet is over 10 years old and over one-quarter is approaching (or exceeding) 16 years of age. With few exceptions, bus bodies are constructed locally on chassis imported by motor vehicle dealers. Conventional chassis are used for this purpose, without any consideration of engine capacity, fuel efficiency or emissions standards. The result is a bus fleet that is considerably less fuel-efficient than it ought to be, consuming 13.4% of national fuel consumption per year (43 ktoe of 319 ktoe) [[37]](#footnote-37) despite accounting for only 7% of vehicles on the road.
2. The regulatory body for vehicle registration and licensing, the National Transport Authority (NTA), has recently introduced a Bus Modernisation Programme. This builds on a policy decision[[38]](#footnote-38) that public buses shall be de-licensed on reaching 16 years of age and shall be replaced by semi low-floor models in conformity with Euro II emission standards.[[39]](#footnote-39) To enable bus operators to meet this replacement schedule, the Bus Modernisation Programme offers a financial incentive by which operators benefit from a subsidy of US$ 28,385 on the purchase of a modern semi low-floor bus and exemption from the payment of the associated Value Added Tax (amounting to approximately US$ 15,600). The bus replacement requirements for the next six-year period indicate the need for replacement of a total of 529 buses, as detailed in Table 4 below.

*Table 4: Number of Buses Over 16 Years of Age to be Replaced with Semi Low-Floor Buses (2015-2020)[[40]](#footnote-40)*

|  |  |  |
| --- | --- | --- |
| **Operator** | **No. of buses as of 31.05.15** | **Number of buses to be replaced** |
| **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **TOTAL** |
| NTC | 489 | 21 | 43 | 9 | 31 | 23 | 12 | 139 |
| UBS | 311 | - | - | - | 11 | 3 | 9 | 23 |
| TBS | 204 | 7 | - | 6 | 3 | 4 | 13 | 33 |
| RHT | 100 | - | - | - | - | - | 4 | 4 |
| MBT | 31 | - | - | - | - | - | - | 0 |
| TOTAL | 1,135 | 28 | 43 | 15 | 45 | 30 | 38 | 199 |
| IND OPS | 808 | 88 | 48 | 41 | 49 | 54 | 50 | 330 |
| **TOTAL** | **1,943** | **116** | **91** | **56** | **94** | **84** | **88** | **529** |

1. To date, 34 buses have been replaced under the Bus Modernisation Programme. However, data abstracted from bus companies’ operating returns show that the average fuel efficiency being achieved is 33 litres of diesel/100 km for conventional buses and 38.5 litres of diesel/100 km for the semi low-floor buses. Constrained by the cost of semi low-floor buses, operators can only afford buses produced in India, China and South Korea. Moreover, semi low-floor buses are heavy (over 10 tonnes, compared with 6.5 tonnes for conventional buses) and have larger engines (8,200 cc instead of 6,900 cc). Using empirical operational values (an average daily distance travelled by a bus of 215 km and an average of 330 days of operation per year), the annual fuel consumption for each class of bus is estimated to be 23,400 litres for the standard buses and 27,300 litres for the new buses. The perverse result is that each new bus emits 25.7 tCO2 *more* per year than the bus it is replacing.
2. Hybrid buses use a combination of diesel and an electric motor using a regenerative energy storage system.[[41]](#footnote-41) The use of hybrid buses has gained momentum in large cities where fuel economy and vehicle emissions are of concern.[[42]](#footnote-42) Depending on operating conditions, hybrid buses have the potential to yield 35% savings on fuel and about 40% lower exhaust emissions[[43]](#footnote-43), thereby complying with Euro V emission standards.[[44]](#footnote-44)
3. Taking into account the number of buses requiring replacement during the six-year period, the cumulative total fuel consumption of each type of vehicle would be as set out below in Table 5:

*Table 5: Cumulative Fuel Consumption of Replacement Buses (Millions of Litres of Diesel)*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** | **Total** |
| Conventional diesel bus | 2.72 | 4.85 | 6.16 | 8.36 | 10.33 | 12.39 | 44.79 |
| Diesel semi low-floor bus | 3.17 | 5.65 | 7.18 | 9.75 | 12.05 | 14.45 | 52.25 |
| Hybrid semi low-floor bus | 2.06 | 3.67 | 4.67 | 6.33 | 7.82 | 9.38 | 33.39 |

1. If the Bus Modernisation Programme were to be repurposed with a focus on climate change mitigation (as opposed to simply bus modernisation), and the Programme were to support the adoption of hybrid semi low-floor diesel-electric buses, the GHG benefits would amount to ~101,000 tCO2 by 2020. As a conservative start, the GCF programme proposes to facilitate the switch of one-third (175) of the 529 buses scheduled for replacement up to 2020 to hybrid diesel-electric semi low-floor models. The GHG benefits of this intervention will amount to ~30,300 tCO2 by 2020.
 |
| **C.3. Project / Programme Description** |
| 1. The programme will be implemented in two phases so that funds can be disbursed in a logical and appropriate manner without burdening the GCF or the executing agencies. Phase 1 will be implemented between 2016-2018; Phase 2 will be implemented between 2019-2023.
2. Under Phase 1 (2016-2018), the following components will be executed:
* Component 1: Institutional strengthening for renewable energy (GCF finance: US$ 1.1 million; co-finance: US$ 1.08 million)
* Component 2, Phase 1: Grid Strengthening and PV deployment (GCF finance: US$ 10 million; co-finance: US$ 20 million)
* Component 4, Phase 1: Energy-efficient public transport (GCF finance: US$ 7 million; co-finance: US$ 13.27 million)
1. Phase 1 will put in place the necessary framework for further deployment of renewable energy during Phase 2 and will initiate improvements in the public transport sector. By the end of Phase 1, the Mauritius Renewable Energy Agency will be fully operational and will be contributing to the development of the energy landscape of Mauritius. CEB will have completed the centralised elements of its grid strengthening (AGC system and batteries) and grid absorption capacity will have been substantially increased to accommodate a total of 185 MW of intermittent RE. The first three bus routes for the smart bus lines will be operational and 85 hybrid diesel-electric buses will be on the road. Towards the end of Phase 1, an evaluation will be carried out on the three components so as to enable lessons learned to be assimilated and inform the execution of Phase 2.
2. Under Phase 2 (2019-2023), the following components will be executed:
	* Component 2, Phase 2: Grid Strengthening and PV deployment (GCF finance: US$ 19 million; co-finance: US$ 140.4 million)
	* Component 3: PV mini-grids on the Outer Island of Agalega (GCF finance: US$ 0.9 million; co-finance: US$ 1.2 million)
	* Component 4, Phase 2: Energy-efficient public transport (GCF finance: US$ 7 million; co-finance: US$ 12.86 million)
3. Phase 2 will build on experiences obtained and frameworks put in place in Phase 1 in order to accelerate the deployment of PV and hybrid buses. The calls for proposals for PV systems under Phase 3 of the SSDG scheme will enable the visibility of the GCF programme to be scaled-up, with an expected ~3,927 beneficiaries across all user categories. 21 MW of rooftop PV and 4 MW of medium-scale solar plants will be on the (strengthened) grid, and smart meters installed in SSDG Phase 3 premises will be feeding real-time data back to CEB for enhanced grid management. The three villages of Agalega will be supplied with clean energy, thereby becoming an example for all SIDS. The full complement of 175 hybrid buses will have been purchased by the bus companies and the Mauritian public will be enjoying a higher-quality public transport system.

*Component 1: Barrier Removal*1. With the assistance of the GCF programme, MEPU will receive the necessary assistance to develop a fit-for-purpose legal and regulatory framework to allow the ambitious scale-up of renewable energy in Mauritius. GCF funding will also be used to develop a staffing plan/structure for MARENA that is aligned with the needs of the Long-Term Energy Strategy; to develop a secondment strategy that will allow experienced CEB and MEPU staff to work at MARENA for limited periods (e.g. 1-2 years), thereby building capacity quickly; and to establish South-South links with other energy regulators, notably in India and South Africa. With GCF support, MARENA will be empowered and fully operationalised to assist renewable energy (RE) investors, particularly Independent Power Producers (IPPs), in reducing the transaction costs and time delays currently associated with RE investments. MARENA will also provide technical oversight and policy planning support.
2. The Government has earmarked approximately US$ 500,000 in the current budget (2015-2018) to establishing MARENA. However, this is insufficient if the Agency is to live up to its market-catalytic potential. Incremental GCF support of US$ 1 million will ensure this potential is met.
3. Moreover, the GCF programme will support CEB and MEPU to build their internal capacities and exposure to GCF programme implementation with the aim of ensuring their accreditation, by the end of Phase 1 of the programme (2018), as national GCF Accredited Entities. The NDA, in conjunction with UNDP, will conduct a capacity assessment of MEPU and CEB to assess their level of readiness to seek accreditation to the GCF. UNDP will hire a team of consultants with experience in accreditation matters to work with CEB and MEPU to address obvious shortcomings in their current systems and processes, and will then prepare the relevant documentation and assist in the submission of an accreditation dossier to the GCF. UNDP will assist CEB and MEPU in responding to GCF queries during the accreditation process.

*Component 1: Goals and Anticipated Outcomes*1. The principal outcome of Component 1 will be the emergence of a strengthened institutional and regulatory system for renewable energy in Mauritius, which will directly facilitate the implementation of Component 2. By the end of Component 1 (2018), the Government will have the required legal texts, systems and institutional capability to effectively manage the evolution and growth of the renewable energy sector. The promotion of renewable energy technologies and a better understanding of the sector from an investor’s perspective are expected to result in reduced GHG emissions through the scale-up of renewable power generation, both centralised and decentralised, at a national scale.

*Component 2: Barrier Removal*1. With the assistance of the GCF programme, CEB will be enabled to acquire and install the equipment necessary to ensure 185 MW of intermittent renewable energy can be connected to the grid without jeopardising grid stability.[[45]](#footnote-45) The GCF programme will provide technical and financial support to the required grid strengthening through US$ 12 million of GCF finance and US$ 20 million of co-finance (US$ 1 million grant from UNDP, US$ 17 million of concessional lending from AFD and a contribution of US$ 2 million from CEB).
2. 25 MW of this power will be supplied by PV installations facilitated through a GCF-supported Phase 3 of the SSDG scheme, with households supplying 5 MW, public buildings and NGOs 9 MW, and commercial entities 11 MW (see Table 6 below). 21 MW will be governed by the terms of the Small-Scale Distributed Generation grid code (installations up to 50 kW – see Annex XIIIb) and 4 MW by the Medium-Scale Distributed Generation grid code (installations between 50 kW-2 MW – see Annex XIIIc and XIIId). These grid codes were developed by CEB with UNDP assistance and were formally introduced in 2014. The remaining 100 MW of renewable energy capacity[[46]](#footnote-46) will be installed by CEB and Independent Power Producers at utility-scale (installations greater than 2 MW) according to CEB’s standard tender process.[[47]](#footnote-47) Over 39 MW of such utility-scale power has already been pipelined but has been unable to proceed because of the grid stability constraints.
3. To be clear, the GCF programme will facilitate a total capacity of 185 MW of renewable energy on the Mauritian grid through its support to grid strengthening. Of this 185 MW, 25 MW will be directly facilitated by the GCF programme through its support to a third phase of the SSDG scheme. The GCF programme will enable the residual 100 MW (through grid strengthening) but will not be directly involved in financing or supporting these utility-scale installations.

*Table 6: SSDG Phase 3 User Categories[[48]](#footnote-48)*

|  |  |  |  |
| --- | --- | --- | --- |
| **Category of User** | **Total MW Allocated** | **Number of Beneficiaries** | **Average Size of System** |
| Households | 5 MW | 1,400 – 2,500 | 2 kWp – 3.5 kWp |
| NGOs | 2 MW | 4 – 10 | 200 kWp – 500 kWp |
| Public buildings (including schools, charitable institutions, orphanages, bus shelters, etc.) | 7 MW | 1,400 | 5 kWp |
| Commercial centres | 7 MW | 10 – 15 | 500 kWp – 700 kWp |
| Private sector (medium-scale IPPs) | 4 MW | 2 | 2 MW |
| **Total** | **25 MW** |  | **8 kWp – 14 kWp** |

1. GCF resources will be used to provide a grant to SSDG Phase 3 users to partially cover the upfront cost of investing in small- and medium-scale PV systems. The basis of the grant will be different for households, public buildings and NGOs on the one hand and private-sector adopters on the other. For households, NGOs and public buildings, the grant will cover approximately 30% of the upfront system and installation cost, as it is considered to be a more equitable approach than a FiT (which will be discontinued in Phase 3 of the GCF-supported SSDG scheme)[[49]](#footnote-49) to ensure scaled-up adoption of small-scale PV. For private-sector adopters and for medium-scale adopters (i.e. adopters of systems between 50 kW and 2 MW), the grant amount will be approximately the same. However, the basis of the grant will be calculated through the Viability Gap Funding methodology implemented in the relevant call for proposals. This is because different private sector project developers may have different input values in terms of cost of debt that they can secure, their own cost of equity, capital costs, O&M costs, etc. The developers that can bring the most low-cost debt, reduced capital costs and reduced O&M costs will be selected, being more cost-efficient, while ensuring the quality of the PV systems to be installed. This method, which has been used to great effect by the Solar Energy Corporation of India (SECI)[[50]](#footnote-50), will enable policy-makers to choose the best bidders on the basis of a fixed tariff (set at CEB’s marginal cost of generation) and an IRR deemed to be reasonably attractive. Overall, these grant resources will represent just ~6% of the total investment cost associated with the expected 185 MW of renewable energy to be installed by 2023. In addition to the upfront grant provided by GCF resources, AFD will, if the GCF programme is approved, establish a loan scheme for PV adopters under SSDG Phase 3 so that the residual (post-grant) purchase price of the PV systems can be borrowed and then repaid in installments. A fixed-rate Euro loan of 2.86% will be offered by AFD.
2. Augmenting these PV installations, smart meters will be installed in SSDG Phase 3 premises so as to optimally manage the generation output of the rooftop solar PV installations and thereby lay the basis for a smart grid at national scale. The results of the implementation of the smart grid will then inform CEB on the requirements for national-scale smart grid deployment and the development of a strategy accordingly.

*Component 2: Goals and Anticipated Outcomes*1. Implementation of this component will result in reduced GHG emissions through increased access to low-emission energy and power generation. By the end of Component 2, 161,600 tCO2e will have been directly avoided due to the installation of 25 MW PV directly assisted by the GCF programme. An additional 3.2 million tCO2e are expected to be indirectly avoided as a result of expansion of intermittent renewables permitted by the grid strengthening activities. Taken over the entire population of Mauritius and Rodrigues (396,335 households), Component 2 will enable one-third (129,500) of households to have access to low-emission energy.

*Component 3: Barrier Removal*1. The argument for introducing PV power on Agalega is very clear. As outlined in a PV assessment study commissioned by UNDP in 2010 (Annex IId) and a later costing study (Annex IIe), with Agalega’s insolation and electricity demand profile, hybrid mini-grids[[51]](#footnote-51) serving the three villages could source ~80% of their electricity from solar power, requiring only relatively minor injections of diesel power. This would result in financial savings to OIDC of US$ 106,000 per year – resources that OIDC is committed to allocating to long-term upkeep and expansion if given the opportunity. The principal barrier preventing the three villages of Agalega from operating solar-diesel hybrid mini-grids is technical capacity. A number of PV systems have been mothballed since 2009 because of a lack of trained technicians to maintain the system.

*Component 3: Goals and Anticipated Outcomes*1. The principal goal of Component 3 will be to transform Agalega into the first low-emission inhabited island in the Republic of Mauritius. Approximately 300 inhabitants will benefit from this development, which will involve rehabilitation of the existing PV systems where feasible, and the installation of an additional 300 kW of PV panels and accompanying battery storage (diesel will only be required as back-up) on the existing mini-grid infrastructure. Training will be provided to 3 technical staff on the island and an additional 5 staff on the mainland to act as back-up and to provide logistical support in the event of new equipment being required. The total cost of these interventions will be US$ 2.1 million, partially financed by the GCF (US$ 900,000) and partially from co-finance (US$ 1.2 million).

*Component 4: Barrier Removal*1. The public transport sector in Mauritius is operated by private-sector operators that are responsive to price/profit signals; and is licensed by the Government (by the National Transport Authority), thereby offering accessible regulatory levers to promote sector-wide transformation. The cost of hybrid semi low-floor diesel-electric buses is, however, a serious barrier to uptake. The NTA estimates the incremental cost of such hybrid buses relative to conventional buses is 75-80%. This significant disincentive to switching has been overcome in a number of countries[[52]](#footnote-52) through the use of offsetting financial incentives. This is particularly needed in Mauritius, where bus operators are struggling financially (despite significant Government subsidies amounting to US$ 52.5 million per year) and are extremely constrained in their ability to invest in fleet replenishment.[[53]](#footnote-53)
2. The GCF programme will enable successful upgrade of old buses – one-third of those scheduled to be de-licensed on reaching 16 years of age – to new, fuel-efficient hybrid models. GCF resources will be used to cover the US$ 60,000 price differential between the full cost of each of 175 hybrid diesel-electric semi low-floor buses (US$ 190,000) on the one hand and the contribution of (i) the Government under the Bus Modernisation Programme (US$ 28,385 grant and additional tax rebate of US$ 15,600 per bus) and (ii) the bus operator (US$ 104,000 per bus) on the other. The total cost of replacement of the 175 buses is expected to be US$ 33 million, of which the GCF will contribute US$ 10.5 million[[54]](#footnote-54) (32%). The hybrid diesel-electric buses will be deployed nationally, enabling approximately 100,000 passengers to benefit from comfortable, low-emission transport on a daily basis.
3. In addition, Component 4 will enable the modernisation of the accompanying transport infrastructure by enabling the implementation of a Smart Bus Information System (SBIS). Traffic congestion is a significant problem in Mauritius[[55]](#footnote-55), and a number of studies and reports (including the Second National Communication to the UNFCCC (2010) and the Integrated National Transport Strategy as long ago as 2001[[56]](#footnote-56)) have identified the pressing need to migrate commuters from their cars to buses. Upgrading buses to new, more comfortable and more accessible models represents one means of doing this. However, survey work undertaken by the NTA has revealed that an equally important barrier to switching is travellers’ lack of awareness of bus schedules and their fears of delays / cancellations if travelling by bus.[[57]](#footnote-57) The NTA has, therefore, developed a plan to roll-out an SBIS (the SMARTLINE project[[58]](#footnote-58)), commencing as a first phase with the acquisition and installation of GPS transponders (for the buses) and information screens (for the bus shelters) on three bus routes[[59]](#footnote-59) that together serve 30,000 passengers (5% of the country’s bus passengers) each day. Maps of these bus routes, together with the bus shelters that will have information screens installed, are provided in Annex IX. Mobile apps will also be developed to enable commuters to obtain bus travel information at any location in real-time. The total cost of this first phase of the SBIS is US$ 3.5 million, of which the bus operators will finance US$ 2 million (for installation of GPS and other equipment at their premises and on their buses) and the GCF will finance the incremental residual (US$ 1.5 million) which cannot be covered by the NTA’s limited budget. The Government of Mauritius is committed to securing the necessary funds to finance, in conjunction with the bus operators, the entirety of the funds necessary for a scaled-up SBIS Phase 2 (covering an additional 20 bus routes) if the GCF-supported Phase 1 meets expectations. Daily passenger numbers along the three Phase 1 target bus routes are expected to increase by 3,000 per day following implementation as a combined result of the upgrade to new buses and the provision of real-time schedule information, with resulting traffic decongestion along the routes and emission reduction benefits of ~4,500 tCO2e per year.
4. A complementary training programme will be offered to bus drivers on fuel-efficient driving and inspection / maintenance of the hybrid buses.[[60]](#footnote-60) This will be run alongside capacity building on the SBIS to be provided by the NTA so as to minimise costs and maximise attendance.

*Component 4: Goals and Anticipated Outcomes*1. The principal goal of Component 4 is to promote the increased use of low-carbon public transport. Fleet renewal to new, more comfortable buses and the adoption of an SBIS for bus passengers is expected to double the baseline growth in daily passenger numbers from 2% to 4%. Component 4 will produce total emission reductions of ~45,600 tCO2 by the end of the programme through the replacement of 175 old buses with hybrid models and modal switching to public transport.
 |
| **C.4. Background Information on Project / Programme Sponsor** |
| 1. The Executing Entity of the overall programme will be the GCF National Designated Authority, the Ministry of Finance and Economic Development. Operational responsibility for executing each component will be delegated to the relevant institutions:
	* Component 1: Ministry of Energy and Public Utilities
	* Component 2: Central Electricity Board
	* Component 3: Outer Islands Development Corporation
	* Component 4: Ministry of Public Infrastructure and Land Transport / National Transport Authority

*Ministry of Finance and Economic Development (MOFED)[[61]](#footnote-61)*1. The Ministry of Finance and Economic Development – which employs 393 staff, including 10 in the Development Cooperation Section and dedicated sector management teams – is responsible for coordination of all development partners, including multilateral funding agencies, with regard to external assistance, including budget support programmes, grants, loans and technical assistance. All such external assistance is overseen by the Resource Mobilisation, Development Cooperation and Regional Initiatives Directorate of the Ministry. This Directorate consists of a Director (who also serves as the GCF NDA) and 10 professional staff. MOFED also contains Sector Management and Support Teams (SMSTs). The Resource Mobilisation, Development Cooperation and Regional Initiatives Directorate and the SMSTs for Transport and Renewable Energy have been heavily involved in the formulation of the GCF programme proposal, as have the other organisations listed below.

*Ministry of Energy and Public Utilities (MEPU)[[62]](#footnote-62)*1. MEPU has the mandate to formulate policies in the energy, water and wastewater sectors, and to maintain a responsive legal framework to govern these sectors. The Ministry employs 54 professional staff and has a long track record of implementing strategic energy projects: notable examples in recent years include operationalisation of the Energy Efficiency Management Office, the SSDG scheme and feasibility studies for wind projects. MEPU has been the executing partner of a number of UNDP projects, including the GEF-financed ‘Removal of Barriers to Energy Efficiency and Energy Conservation in Buildings’ project[[63]](#footnote-63) (2008-14) and the SIDSDOCK-financed ‘Energy Efficiency and Renewable Energy in Mauritius’ project (2012-16).[[64]](#footnote-64)

*Central Electricity Board (CEB)[[65]](#footnote-65)*1. The Central Electricity Board is a parastatal entity established under the CEB Act (1964).[[66]](#footnote-66) CEB is responsible for generation (in collaboration with IPPs), transmission and distribution of electricity in Mauritius. CEB employs over 600 professional staff, including a dedicated Small-Scale Distributed Generation Department consisting of 4 staff who manage the SSDG scheme. CEB has extensive experience managing multi-million – and, in some cases, multi-billion – rupee projects. CEB is currently executing the GEF-financed ‘Removal of Barriers to Solar PV Power Generation in Mauritius, Rodrigues and the Outer Islands’ project (2011-16).[[67]](#footnote-67)

*Outer Islands Development Corporation (OIDC)*1. The Outer Islands Development Corporation Act No. 41 of 1982[[68]](#footnote-68) provides that the Corporation shall be responsible for the management and development of the Outer Islands (i.e. all of the island comprising the State of Mauritius other than the islands of Mauritius and Rodrigues). Agalega and the Cargado Carajos group of islands (St. Brandon) fall under OIDC’s jurisdiction. The Corporation employs 175 staff, of whom 150 work on issues relating to Agalega. OIDC will execute Component 3 of the GCF programme jointly with CEB and the Energy Services Division of the Ministry of Public Infrastructure and Land Transport.

*Ministry of Public Infrastructure and Land Transport (MPILT)[[69]](#footnote-69)*1. The Ministry of Public Infrastructure and Land Transport is one of the largest ministries, employing 1,600 staff. The Energy Services Division, which employs 18 professional staff, is responsible for the provision of electrical support services, including air conditioning, lifts, standby generators, Uninterruptable Power Supply (UPS) systems, public lighting, the provision of electrical installations on Government premises and maintenance of electrical installations. The Land Transport Division is responsible for roads and related infrastructure, and employs 18 professional staff. The Ministry has a long track-record of implementing relevant projects, including the Bus Modernisation Programme. The SMARTLINE project is in the Ministry’s pipeline of imminent projects. MPILT is the parent ministry of the National Transport Authority, the Road Development Authority and the Traffic Management and Road Safety Unit.

*National Transport Authority (NTA)[[70]](#footnote-70)*1. The National Transport Authority is responsible for the registration of vehicles, the issuance of licences for vehicles and the collection of road tax. All applications for licences relating to the provision of public transport services are made to the NTA and the Authority also determines the fares applicable to public transport. The NTA employs over 30 professional staff (300 employees in total) and is responsible, among other things, for managing a US$ 34 million free travel scheme financed by the Government and a US$ 18 million financial support scheme for bus operators. The incremental financial support to the adoption of hybrid buses through the GCF-upgraded Bus Modernisation Programme will be managed jointly by the NTA and the Ministry of Finance and Economic Development.
 |
| **C.5. Market Overview (if applicable)** |
| *Renewable Energy*1. Mauritius has been experiencing growing electricity demand since its independence in 1968. CEB, in its Integrated Electricity Plan (IEP) 2013-2022 under the business-as-usual scenario, estimates that electricity demand for the next 8 years will grow at a compound annual rate of 2.7%.

*Provide the key competitors with market shares and customer base (if applicable).*1. CEB, as mandated by the CEB Act 1964, is the sole entity responsible for electricity transmission, distribution and sales. However, a number of IPPs are actively involved in power generation. To effectively manage power sector operations, PPAs and ESPAs are agreed between the CEB and the IPPs for the supply of electrical energy to the grid, which CEB subsequently sells to end-users. As of mid-2015, there are 7 major IPPs supplying electricity to the grid, mostly using landfill gas and bagasse.

*Provide pricing structures, price controls, subsidies available and government involvement (if any).*1. Electricity prices[[71]](#footnote-71) for end-users are based on CEB development plans. The last tariff revision was carried out in 2010 and the price of electricity has remained unchanged since then. In general, producer prices in the power sector are agreed, following negotiation, between the service provider (CEB) and the IPPs. The purchase prices are governed by mutually-binding PPAs and ESPAs. The purchase prices of power are eventually *pass-through* to end-users. In previous contracts, Government guarantees have been used to hedge against the risk of CEB default. Electricity tariff increases require the Government’s prior approval.
2. The SSDG scheme launched in 2010 included a feed-in tariff (FiT) as part of a broader revised Grid Code for small-scale RE generation (Annex XIIIa). The FiT was targeted specifically at Small Independent Power Producers (SIPPs) and was formulated on the basis on an internal rate of return (IRR) of 7.5% for the SIPPs (mainly households) over 15 years.

*Public Transport*1. Mauritius has a fleet of 1,943 buses operating along 302 routes. Services are provided by one parastatal entity (the National Transport Corporation), four private bus companies and over 800 individual operators grouped within cooperative societies. One-third of the bus fleet is over 10 years old; over one-quarter is approaching (or exceeding) 16 years of age and is due for replacement during the coming six years. The fleet size has increased by an average of 3.3% per year during the past 10 years.
2. Public transport services meet the travel needs of 600,000 passengers daily and provide 13,500 trips for that purpose.
3. Key competitors for the licensed operators are private micro-bus owners and private cars providing services along the same corridors for payment. The Government is strengthening legislation and enforcement measures to deter unlawful competition and to discourage passengers from using illegal means of transport.

*Provide pricing structures, price controls, subsidies available and government involvement (if any).*1. Bus fares[[72]](#footnote-72) are determined by the Government, with increases granted periodically at undefined periods. When fare increases are considered to impact adversely on other economic sectors, the Government tends to avoid such increases and, instead, intervenes through financial support to the bus operators. The fare structure is tapered and favours long-distance travel over shorter journeys.
2. The Government exercises control over the price of diesel, which is an important cost element in transport operations. It also provides financial support to bus operators for shortfalls in revenue arising from inadequate fare increases and for increases in the price of diesel over an agreed base price.
3. Since 2005, the Government has implemented a free travel scheme for students and old-aged persons, and it compensates operators for trips undertaken by these users.
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| **C.6. Regulation, Taxation and Insurance** |
| *General* 1. The Environment Protection Act (EPA) 2002 (amended 2008)[[73]](#footnote-73) provides the legislative and administrative framework for the protection and preservation of the environment. Under the EPA, power generation and transmission activities are required to have an environmental impact assessment (EIA). However, due to the type and scale of the small-scale rooftop PV systems, Agalega mini-grids and fuel-efficient buses being proposed under the GCF programme, these components are exempted from an EIA. This exemption was confirmed in writing on 1 July 2015 by the Director of Environment, Ministry of Environment, Sustainable Development, Disaster and Beach Management (see Annex VIb). However, as provided for in Part IV of the EPA, the two 2 MW medium-scale PV installations that will be supported by the GCF programme under Phase 3 of the SSDG will be subject to EIAs and submission of environmental monitoring plans prior to the start of works (section 18(2) (l) of EPA 2002). The successful IPP bidders for the two medium-scale PV installations will be required to undertake EIAs as a condition of their power generation licences being issued.
2. Waste that may be generated by the programme, notably rooftop PV panels at the end of their lifetimes, will be subject to the relevant Local Government Regulations and Environmental Protection Regulations of Mauritius. Environmental Protection Regulations on environmental standards such as noise (Government Notice (GN) 17 of 1997) and ambient air quality (GN 105 of 1998, Second Schedule)[[74]](#footnote-74) will be particularly relevant to Component 4 (the Bus Modernisation Programme) and will be complied with during programme implementation. Working conditions will comply with the relevant provisions set forth in the Occupational Health and Safety Act 2005[[75]](#footnote-75), Labour Act 1975[[76]](#footnote-76), Employment Rights Act 2008[[77]](#footnote-77) and the Equal Opportunities Act 2008.[[78]](#footnote-78)
3. Mauritius is a low-tax regime jurisdiction. A flat rate of 15% is applied for both income tax (for individuals) and corporate tax. In addition to these taxes, a 15% value-added tax is raised on all purchases, except for some exempted goods and services.[[79]](#footnote-79). There is no restriction on foreign exchange (FX) in Mauritius.[[80]](#footnote-80)

*Specific*1. There are neither customs/excise duties nor Value Added Tax on PV panels or low-floor buses for public transport.
2. Buses providing public transport services require a road service licence and a public service licence issued by the NTA. Buses that will be replaced under the GCF programme have already been issued with these licences, and these licences will be transferred to the replacement buses and issued from their date of registration.
3. Buses used for public transport are exempted from duties and taxes at importation. They are liable to a registration fee of MUR 32,800 (~US$ 931) per bus and to annual operating fees and taxes that represent a small fraction of operating costs.
4. The need for all road vehicles to have a third-party insurance policy is mandatory. In the case of buses, operators usually have comprehensive insurance cover that includes full insurance cover for the number of passengers allowed to be transported on the bus. The cost associated with insurance cover amounts to MUR 125,000 (~US$ 3,562) per bus per year.
 |
| C.7.  **Institutional / Implementation Arrangements** |
| 1. The programme will be implemented following UNDP’s National Implementation Modality (NIM), according to the Standard Basic Assistance Agreement between UNDP and the Government of Mauritius signed in 1974 and the Country Programme Document (CPD). The GCF programme has been officially endorsed by the National Designated Authority, the Ministry of Finance and Economic Development (MOFED) – the Letter of No Objection is provided in Annex Ia. MOFED will oversee the programme execution and ensure that it is implemented in accordance with the applicable national policies.
2. The Implementing Partner in UNDP terminology – the Executing Entity in GCF terminology – is the entity responsible and accountable for managing the programme, including the monitoring and evaluation of programme interventions, achieving programme outcomes, and for the effective use of UNDP/GCF resources.
3. The Implementing Partner may enter into agreements with other organisations or entities, namely Responsible Parties, to assist in successfully delivering project outcomes. A Responsible Party is defined as an entity that has been selected to act on behalf of the Implementing Partner on the basis of a written agreement or contract to purchase goods or provide services using the project budget. In addition, the Responsible Party may manage the use of these goods and services to carry out project activities and produce outcomes. All Responsible Parties are directly accountable to the Implementing Partner in accordance with the terms of their agreement or contract with the Implementing Partner.
4. Responsible Parties under the GCF programme are
	* Component 1: Ministry of Energy and Public Utilities
	* Component 2: Central Electricity Board
	* Component 3: Outer Islands Development Corporation
	* Component 4: Ministry of Public Infrastructure and Land Transport / National Transport Authority
5. The management arrangements for the programme are summarised in the chart below:

**Programme Board****Senior Beneficiaries:** **Ministries****Households****NGOs****Private sector****Executive:****MoFED****UNDP****4 Project Directors (PDs) - to be nominated by the Senior Suppliers****Senior Suppliers:****GCF****Ministry of Energy and Public Utilities** **Central Electricity Board****Outer Islands Development Corporation****Ministry of Public Infrastructure and Land Transport****Programme Assurance****Board members or delegated to other individuals****Project Support****Four Project Assistants****One Finance officer****UNDP****National Experts****International Experts****Programme Organisation Structure****Four Project Managers (1 per Senior Supplier)****1 Programme Coordinator**  1. The Programme Board is the group responsible for making, by consensus, management decisions for the programme when guidance is required by the Programme Coordinator, including recommendation for UNDP / Implementing Partner approval of programme plans and revisions. In order to ensure UNDP’s ultimate accountability, Programme Board decisions will be made in accordance with standards that shall ensure management for development results, best value for money, fairness, integrity, transparency and effective international competition. In case a consensus cannot be reached within the Board, the final decision shall rest with the UNDP Programme Manager. The Programme Board will meet on a semi-annual basis.
2. Each programme component will be overseen by a Project Director. Each Project Director will chair a Project Sub-Board focused on a specific programme component. Each Sub-Board will consist of relevant stakeholders, and will be detailed in the UNDP Project Document. As with the Programme Board, each Sub-Board is responsible for making, by consensus, management decisions when guidance is required by the Programme Coordinator and/or Project Manager. Programme Sub-Board decisions will be made in accordance with standards that shall ensure management for development results, best value for money, fairness, integrity, transparency and effective international competition. In case a consensus cannot be reached within a Sub-Board, final decisions shall rest with the Programme Board. Each Programme Sub-Board will meet on a quarterly basis.
3. Programme assurance is the responsibility of each Board and Sub-Board member; however, the role can be delegated. The programme assurance role supports the Programme Board and Sub-Boards by carrying out objective and independent project oversight and monitoring functions. This role ensures appropriate programme management milestones are managed and completed. Programme Assurance has to be independent of the Programme Coordinator and Project Managers; therefore, the Programme Board and Sub-Boards cannot delegate any of their assurance responsibilities to the Programme Coordinator or Project Managers. A UNDP Programme Officer typically holds the Project Assurance role on behalf of UNDP. In addition, the UNDP-Global Environment Finance Unit in the Regional Service Centre (Addis Ababa) provides oversight and quality assurance support.
4. The Programme Coordinator, based at UNDP or at the Ministry of Finance and Economic Development (final decision to be made at the inception stage), will be responsible for the overall coordination of the programme, timely recruitment of the four project managers by the UNDP, and will ensure UNDP’s support in all aspects of the programme. UNDP will aim to ensure that there is the necessary synergy between the different programme components. The Programme Coordinator will quality-assure monitoring and evaluation documentation submitted to the GCF and will review annual budgets submitted by the Project Managers before transmission to the Project Directors. The Programme Coordinator will be responsible for liaising with the relevant Project Directors and ensuring that the Project Managers deliver on their respective mandates, identify bottlenecks and bring a problem-solving approach to the delivery of the programme. The Programme Coordinator will also be responsible for mobilising the relevant UNDP support in respect of relevant operational aspects of the project.
5. At project (i.e. component) level, the governing entity is the Project Sub-Board constituted as per the organogram below (example given for Component 2):

**Project Sub-Board****Senior Beneficiaries:** **Ministries****Households****NGOs****Private sector****Executive:****Project Director - to be nominated by the Senior Supplier****UNDP****Senior Suppliers:****GCF****Central Electricity Board****Project Assurance****Sub-Board members or delegated to other individuals****Project Support****Chief Technical Advisor****Technical Assistance****Procurement, Installation and Commissioning of Equipment** **Typical Component-Level Organisation Structure****Project Manager****Project Assistant**  1. The Project Managers will run their respective projects (components) on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board and the Sub-Boards. The Project Manager function will end when the final programme terminal evaluation report, and other documentation required by the GCF and UNDP, has been completed and submitted to UNDP for the component under his/her responsibility. The Project Manager is responsible for day-to-day management and decision-making for his/her programme component. The Project Manager’s prime responsibility is to ensure that the component produces the results specified in the Project Document, to the required standard of quality and within the specified constraints of time and cost. The Implementing Partner appoints the Project Manager, who should be different from the Implementing Partner’s representative on the Project Board and Sub-Board. Prior to the approval of the programme, the Programme Developer role is held by the UNDP staff member responsible for programme management functions until the Programme Coordinator and Project Managers are in place.

*Small-Scale Distributed Generation – Phase 3*1. The funds for the next cohort of SSDG installations will be transferred to CEB on a quarterly basis. For the US$ 14 million of GCF funds allocated to the SSDG scheme (grants to partially cover the upfront costs of PV system acquisition), approximately US$ 138 million more are expected to be leveraged at minimum. This co-finance will consist of: (a) the residual cost of each PV system not covered by the GCF (of which, 37% is expected to be covered by AFD loans, the remainder through user self-financing) and CEB’s payments (at marginal cost) to SSIPs for the electricity supplied by the SSIPs to the grid (US$ 119 million in total). SSIP applicants (for example, households) will submit their application forms to CEB, which will then send its verification team to the applicant’s premises to ensure that the installation complies with the Grid Code. Once CEB has carried out its verification, it will send the information to MEPU so that the Ministry may issue the SSDG licence. From that point onwards, the CEB SSDG Unit will, on a monthly basis, assess the amount of electricity produced by the Small Independent Power Producer (SIPP) and effect payment on a monthly basis.

*Assistance to Bus Modernisation Programme*1. In terms of assistance to the Bus Modernisation Programme, funding under the GCF programme will be made available to the Ministry of Finance and Economic Development (MOFED), which will also host the management unit for the funds using the existing institutional architecture of the Bus Modernisation Programme. The disbursement process in relation to the existing subsidy of US$ 28,385 grants being offered to bus operators for acquisition of diesel semi low-floor buses will be leveraged for the incremental finance the GCF programme will offer for the acquisition of hybrid diesel-electric buses. Once a bus operator acquires and registers a new bus, it will submit an application to NTA for the subsidy. If the bus complies with the technical requirements of construction and use, NTA will certify the claim, will forward a request to the Ministry of Public Infrastructure and Land Transport for approval and for onward transmission of the application to MOFED. The payment will be effected to the operator through the Accountant General’s Office.
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| C.8. Timetable of Project/Programme Implementation |  |  |
| *Please provide a project/programme implementation timetable in* [*section I (Annexes)*](#SectionI)*. The table below is for illustrative purposes. If the table format below is used, please refer to the activities as numbered in Section H. In the case of outputs, please mark when all the required activities will be completed.*106. Please see Annex X. |

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| **D.1.** **Value Added for GCF Involvement** |  |  |
| *Please specify why the GCF involvement is critical for the project/programme.*107*.* The additionality of the proposed GCF funding for Components 2, 3 and 4 has been analysed as an aspect of the financial analysis conducted for each of these components. Details of this additionality assessment are provided in Annex XII and are summarised here.108. For Component 2 (the grid strengthening element), the investment is not financially viable (the Financial Internal Rate of Return, FIRR, is lower than the hurdle rate) if the GCF grant is less than the proposed US$ 13.6 million (38.5% of total project cost).[[81]](#footnote-81)109. For Component 2 (SSDG Phase 3 element), the investment is not financially viable (the FIRR is lower than the hurdle rate) if the GCF grant is less than the proposed US$ 14 million (30% of total project cost). It is to be noted that the capital subsidy for these grid-connected solar PV installations, which is 30% of the total cost of installation, is consistent with the general subsidy level offered in other developing countries, such as India.110. For Component 3 (Agalega PV mini-grids), the estimated revenues collected from households is low since these are poor and vulnerable households living in a remote island, and these revenues cover just 5% of the installation’s operational costs. Given the public good nature of this component, serving a remote and vulnerable community, it is recommended that a GCF grant completely covers the capital costs of this installation.111. For Component 4 (fuel-efficient public transport), the purchase of hybrid buses is not a financially viable investment for bus fleet operators (the FIRR is lower than the hurdle rate) when GCF grants cover 0% or 10% of cost. It barely becomes a financially viable option when GCF grants cover 20% of the cost, which is typically not attractive for private sector investors (particularly financially-weak Mauritian bus fleet operators). Hence, a GCF grant share of 30.3% of costs (US$ 60,000 grant per hybrid bus) brings additionality to this component. |
| **D.2. Exit Strategy**  |
| *Component 1: Institutional Strengthening for Renewable Energy*112. The Mauritius Renewable Energy Agency will be underpinned by a legal framework and an annual budget from Government, using a similar model to that adopted for the Energy Efficiency Management Office (EEMO) which was set up under the UNDP-supported, GEF-financed ‘Removal of Barriers to Energy Efficiency and Energy Conservation in Buildings’ project. The long-term sustainability of MARENA will be assured through its mandate, as embodied in national law. *Component 2: Grid strengthening and PV deployment*113. The move to greater integration of intermittent renewables cannot be a short-term measure as the contracts that will be entered into with the Phase 3 SSDG Small Independent Power Producers (SIPPs) will be over 15 years as per normal practice in Mauritius. In addition, Agence Franҫaise de Développement will provide low-interest loans to small-scale IPPs under SSDG Phase 3 to ensure sustained uptake. AFD will also provide concessional finance to enable CEB to further expand and maintain the network in view of a greater proportion of renewables on the grid, in accordance with Government targets. *Component 3: PV mini-grid on the outer island of Agalega*114. The staff of the Outer Islands Development Corporation and selected inhabitants of Agalega will undergo the required capacity building in order to be able to maintain the equipment and budget for required maintenance. The OIDC is committed to allocating the expected savings from the switch from diesel to PV (US$ 106,000 per year) to long-term upkeep and expansion of the PV systems.*Component 4: Energy-efficient public transport*115. The support to the Bus Modernisation Programme is an ongoing process and builds on the Government’s commitment to continue supporting the public transport industry in the long-term. The Bus Modernisation Programme involves, in the first instance, the replacement of 529 buses over the coming 6 years. The financing sought from the GCF will not suffice to meet the financial needs of the Programme and co-finance (from the Government, the bus operators and AFD) will play an integral role. For the additional 500 buses that will have to be replaced between 2021-2030, the Government is committed to providing partial finance and to sourcing additional sources of co-finance. |

In this section, the accredited entity is expected to provide a brief description of the expected performance of the proposed project/programme against each of the Fund’s six investment criteria. Activity-specific sub-criteria and indicative assessment factors, which can be found in the Fund’s [Investment Framework](http://www.gcfund.org/fileadmin/00_customer/documents/Operations/3.2_Investment_Framework.pdf), should be addressed where relevant and applicable. This section should tie into any request for concessionality made in [section B.2](#SectionB2).

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| **E.1**. **Impact Potential**Potential of the project/programme to contribute to the achievement of the Fund’s objectives and result areas |
| E.1.1. Mitigation / adaptation impact potential |
| 116. The programme will result in a real and visible paradigm shift in the Republic of Mauritius towards low-carbon sustainable development. The programme directly addresses the two largest-emitting sectors in the country, those of energy and transport, and implements actions specifically recommended in the Second National Communication to the UNFCCC and the UNFCCC Technology Needs Assessment.117. The programme is expected to result in direct emission reductions of ~208,600 tCO2e, broken down by component as follows:*Table 7: Direct and Indirect Emission Reductions to be Achieved by the GCF Programme*

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| --- | --- | --- |
| **Component** | **End-of-Programme Emission Reductions (tCO2e)** | **Source of Emission Reductions** |
| **Direct** | **Indirect** |
| Component 1: Institutional strengthening for renewable energy |  |  | Complementary to, and supportive of, Component 2 in particular. |
| Component 2: Grid strengthening and PV deployment | 161,600 | 484,800 | Grid-connected renewable energy displacing a grid emission factor of 1.01 tCO2/MWh. |
| Component 3: PV mini-grid on the outer island of Agalega | 1,400 |  | PV mini-grid electricity displacing diesel-generated electricity. |
| Component 4: Energy-efficient public transport | 45,616 |  | Roll-out of hybrid diesel-electric buses. |
| **Total** | **208,616** | **484,800** |  |

 118. The programme will, in total (direct and indirect emission reductions), reduce ~693,400 tCO2e by the end of the programme and 4.2 million tCO2e over the lifetimes of the investments enabled by the programme. |
| E.1.2. Key impact potential indicator |
| *Provide specific numerical values for the indicators below.* |
| *GCF core indicators* | *Expected tonnes of carbon dioxide equivalent (t CO2 eq) to be reduced or avoided (Mitigation only)* | *Annual* | 86,675[[82]](#footnote-82) |
| *Lifetime* | 4,187,011[[83]](#footnote-83) |
| *Expected total number of direct and indirect beneficiaries (reduced vulnerability or increased resilience); number of beneficiaries relative to total population (adaptation only)* | *Total* |  |
| *Percentage (%)* |  |
| *Other relevant indicators* | * *Expected increase in the number of households with access to low-emission energy: 49,500*
* *Expected increase in the number of passengers benefitting from new, fuel-efficient hybrid buses: 100,000*
 |
| 119. Please refer to Annex XIIIg for detailed greenhouse gas emission reduction calculations. |
| E.2. **Paradigm Shift Potential**Degree to which the proposed activity can catalyze impact beyond a one-off project/programme investment |
| E.2.1. Potential for scaling up and replication (Provide a numerical multiple and supporting rationale) |
| *Table 8: Scale-Up and Replication Multiples Arising from the GCF Programme*

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| --- | --- | --- |
| **Measure** | **GCF Direct Programme Impact** | **Scale-Up / Replication Multiple** |
| PV | 25 MW of high-visibility rooftop PV installations  | 1.5 |
| Grid Strengthening | 25 MW PV installed | 4 |
| Smart Meters | 3,900 | 25 |
| Public Transport | 100,000 passengers using modern, fuel-efficient bus service each day | 7  |

*(i)* *Rooftop PV*120. The partial grant support provided by the GCF to various categories of consumers will render rooftop solar PV a viable alternative for their energy needs. The highly-visible installations will have a cascading effect in terms of sensitisation and awareness of the population. This impact is difficult to quantify but can conservatively be estimated as a replication multiple of 1.5.[[84]](#footnote-84) *(ii) Utility-Scale Grid-Connected Renewables*121. See Section E.1.2 above. Once the enabling environment, in the form of grid strengthening and the creation of the Mauritius Renewable Energy Agency, has been created through GCF intervention, a key barrier to renewable power investment will have been overcome. There is already significant interest from a range of entities, including specialist power firms, industrial co-generators, NGOs and community groups, to establish themselves as grid-connected renewable energy IPPs. CEB estimates that an additional 125 MW of renewable energy generating capacity will be required over the coming 10 years (2015-2025) to meet energy demand and to meet national RE targets, of which 25 MW will be supplied by Phase 3 of the SSDG scheme. The 100 MW of utility-scale RE to be installed indirectly through the conducive environment established by the GCF programme represents a replication factor of 4. *(iii) Smart Meters*122. The smart grid is composed of a set of equipment, the most visible element of which, to the consumer, is the smart meter. The smart meter will enable two-way communication to the CEB server and will inform CEB of real-time consumption patterns and enable CEB to implement more efficient load dispatch. The GCF programme will directly assist in the installation of 3,900 smart meters, and will provide the foundation for CEB’s stated hope to ultimately roll-out smart meters to 100,000 households. *(iv) Public Transport*123. During the past twenty years, there has been a substantial increase in the number of vehicles in Mauritius due to increasing living standards and easier import of reconditioned cars.[[85]](#footnote-85) Road network development has not kept pace, with the result that congestion has increased, trip times have grown longer and the profitability of public bus operators has fallen.[[86]](#footnote-86) The Government-owned bus company, the National Transport Corporation (NTC), has been loss-making for the past 10 years. The introduction of modern, fuel-efficient buses will represent an attractive alternative to many car-owners, who will be able to make the shift to clean, comfortable, safe, modern buses that offer the latest technological features (such as air conditioning and WIFI internet connectivity). Passenger information systems will help in ensuring up-to-date information about bus schedules and strengthening consumer confidence about service reliability. A replication factor of 7 reflects the fact that approximately one-seventh of the passenger population (700,000) will directly benefit from the GCF programme and therefore expansion to 100% of the bus fleet would reach the entire passenger population. |
| E.2.2. Contribution to the creation of an enabling environment |
| *Describe how proposed measures will create conditions that are conducive to effective and sustained participation of private and public sector actors in low-carbon and/or resilient development.*124. By providing the technical, legal and financial incentives for the promotion of renewable energy, the GCF programme will encourage both public and private actors to invest in renewable energy sources. The public sector will be a long-term beneficiary and promoter of renewable energy through the Mauritius Renewable Energy Agency and the Central Electricity Board. The private sector will benefit from the enabling environment created by the grid strengthening component so as to be able to invest in IPP projects. 125. The development of a clean and modern public transport will not only reduce the GHG emissions from the transport sector but will also trigger a transport modal shift in favour of public transport systems. The expected increase in the number of people using public transport, coupled with savings associated with more fuel-efficient buses, will encourage private and public bus fleet operators to continue to invest in modern and clean transportation systems.*Innovation, market development and transformation*126. GCF support to the expansion of the rooftop PV sector in Mauritius will build on a strong baseline project – Phases 1 and 2 of the Small-Scale Distributed Generation (SSDG) scheme – but represents an innovative approach through the use of an upfront partial grant mechanism for households and non-commercial adopters rather than a feed-in tariff. An undifferentiated feed-in tariff approach is considered financially unsustainable and unduly ‘locks in’ the Government to long-term commitments; moreover, it serves to exclude a large proportion of the (lower-income) population from adopting PV technology. The grant element that will be incorporated into Phase 3 of the GCF-supported SSDG will reduce consumers’ acquisition costs and perceived investment risks. GCF-assisted removal of financial, institutional, capacity and information barriers will also contribute to the development of the solar PV market locally, and may open up potential regional export / investment opportunities for Mauritius.127. In line with the Government’s stated vision, the GCF programme will assist in the modernisation and decarbonisation of the public transport sector, a sector that has suffered from underinvestment and deteriorating profitability for decades. Bus operators will be enabled to upgrade to fuel-efficient semi low-floor vehicles at the same cost as fuel-inefficient equivalents. The introduction of diesel-hybrid vehicles will be an innovation in the local context: no such buses are currently operating in Mauritius. |
| E.2.3. Contribution to regulatory framework and policies |
| *Table 9: Contribution of the GCF Programme to Policy and Regulatory Frameworks*

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| **Component** | **Low-Emission Regulatory and Legal Frameworks** |
| Component 1: Institutional strengthening for renewable energy | The Mauritius Renewable Energy Agency, with the status of a parastatal organisation, will be strengthened with GCF support. Appropriate legislation will be drafted to establish and empower the new institution.  |
| Component 2: Grid strengthening and PV deployment | The Small-Scale Decentralised Generation Programme, an initiative of the Ministry of Energy and Public Utilities and CEB, will be modified and scaled-up with GCF support. It will enable MEPU and CEB to explore new modalities of financing PV and RE systems and create new ownership models. |
| Component 3: PV mini-grid on the outer island of Agalega | The provision of PV panels and their upkeep over the long-term will require a new regulatory framework and the OIDC Act could also be amended to make provision for an SSDG scheme in Agalega. |
| Component 4: Energy-efficient public transport | The Bus Modernisation Programme will be amended to explicitly promote climate change mitigation policy.  |

 |
| E.2.4. Potential for knowledge and learning |
| *Describe how the project/programme contributes to the creation or strengthening of knowledge, collective learning processes, or institutions.*128. Component 1: The Mauritius Renewable Energy Agency will be a new institution that plays a central role in the energy sector. One of MARENA’s specific roles will be to contribute to the creation and strengthening of knowledge, particularly for private-sector investors so as to promote the nascent IPP sector.129. Component 2: CEB staff will be technically equipped to strengthen the national grid to be able to accept larger injections of intermittent renewable electricity. SMEs will receive training to enable them to enter the rooftop PV market. Smart meters installed at the grid edge will generate considerable volumes of data that will be transmitted to CEB using internet protocols; this data will be analysed to improve understanding of consumer electricity usage and will inform the modification of CEB’s grid management strategies.130. Component 3: OIDC staff and other stakeholders on Agalega, as well as OIDC staff on the mainland, will be trained in the installation, management and maintenance of small-island mini-grid systems.131. Component 4: As highlighted in frequent newspaper articles[[87]](#footnote-87), there is a pressing need for proper bus management and driving. Training will be organised for bus drivers and bus companies so as to improve fleet management. |
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| E.3. **Sustainable Development Potential**Wider benefits and priorities |
| E.3.1. Environmental, social and economic co-benefits, including gender-sensitive development impact |
| *Table 10: Environmental, Social and Economic Co-Benefits of the GCF Programme*

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| --- | --- | --- | --- |
| **Co-Benefit** | **Parameter** | **Expected Impact of GCF Programme**  | **Description** |
| Economic | Number of jobs created | 2,500 | ILO identifies the energy sector as the most important cross‐cutting industry in Mauritius, generating significant inter‐industrial linkages that are vital for sustaining growth and economic competitiveness.[[88]](#footnote-88) Employment opportunities from the GCF programme will contribute to the 6.3% of total employment currently considered as constituting ‘green jobs’. Programme-induced jobs will include those associated with SMEs enabled to enter the rooftop PV market and also maintenance jobs associated with hybrid buses. In total, 2,500 jobs are expected to materialise. Direct jobs will include: * Staff of MARENA
* People engaged in the import of PV panels
* Workers employed in installation of PV panels
* Those engaged in the maintenance of the PV panels including regular cleaning
* Bus drivers and conductors on the hybrid buses
* People engaged and trained for the maintenance of the hybrid buses
* System operators of the smart bus lines

Indirect jobs will include all those ancillary businesses set up to support the above activities, such as provision of spare parts.  |
| Economic | Foreign currency savings | US$ 582 million | Currently, 16-19% of imports relate to fuel imports, amounting to more than US$ 1 billion per annum.[[89]](#footnote-89) Given that the transport and energy sectors are the major consumers of fuel, the GCF programme will bring about a considerable reduction in fossil fuel over the lifetime of the buses and PV panels, and with the additional renewable energy operators entering the market following the strengthening of the grid and operationalisation of MARENA.  |
| Economic | Reduction in Government budget deficit | US$ 105 million | The GCF programme will offer US$ 45 million of GCF grant resources to Mauritius and will directly unlock US$ 188.8 million of co-finance.  |
| Social | ‘Democratisation’ of PV | 4-10 NGOs to benefit from partial funding for PV systems | The programme will, under the GCF-supported Phase 3 of the SSDG scheme, launch a call for proposals for households, NGOs, and the public and private sectors in both Mauritius and Rodrigues. This will enable those who are currently unable to afford rooftop PV systems to be able to install them.Installation of PV mini-grids in the Outer Island of Agalega, will enable these islanders, who mostly depend on agriculture and fishing for their living, to obtain access to clean energy and improve their livelihoods through improved energy supply to schools, clinics, refrigeration facilities (for the storage of fish), etc.In addition, the project will improve transportation services for the poor and lower middle-income classes, as they are the principal users of public transport. |
| Environmental | Improved air quality | Lower emissions of NOX, SOX, NMVOCs and CO2 from both public transport and power plants | It is estimated that the emission of nitrogen oxides, non-methane volatile organic compounds and sulphur dioxide will fall by 35% per bus following introduction of the diesel-electric hybrid models. |
| Gender-sensitive development impact | Social and health impacts and economic participation | Expected positive social and health impacts for both men and women through the use of public transport. In addition, through the rooftop PV component, new employment opportunities will benefit men and women. | The additional reliable energy supply from the programme is expected to improve access to electricity of poor female-headed households in Agalega. While the programme is not expected to have other direct gender benefits, there will be training and job opportunities that will ensure representation of women. The improved access to clean energy supply is expected to benefit women and female students who are in need of adequate lighting for safety and security, education and for maintaining households. The improved power supply is also expected to create income-generating opportunities that may involve female entrepreneurs and will certainly help home-based micro-enterprises, many of which are run by women. Participation of women/female headed households will be encouraged in the calls for proposals for rooftop PV systems. |

 |
| E.4. **Needs of the Recipient**Vulnerability and financing needs of the beneficiary country and population |
| E.4.1. Vulnerability of country and beneficiary groups (Adaptation only) |
| 132. Not applicable. |
| E.4.2. Financial, economic, social and institutional needs |
| 133. The need for GCF grant funding is partly explained by the evolution of, and policy on, the public debt of the Government of Mauritius. The public sector debt-to-GDP ratio (international definition) increased from 60.1% percent in 2013 to 61.5 percent in 2014. [[90]](#footnote-90) Net public debt was 54.2% in 2014 and is expected to remain stagnant in 2015/2016. Despite this difficult situation, the Government remains committed to bringing public sector debt down to 50% in 2018, as it is legally required to do under the Public Debt Management Act.[[91]](#footnote-91) However, the fiscal deficit is likely to remain high (3.4%)[[92]](#footnote-92) due to lower than expected economic growth reducing public revenues. According to Statistics Mauritius, the expected GDP growth for 2015 will be 3.8% instead of the initial projection of 4.1%.[[93]](#footnote-93) 134. The institutional needs of the programme’s key stakeholders, and the incremental logic of GCF support, are outlined in Sections C.1, C.2, C.3, D.1 and F.1. |
| E.5. **Country Ownership**Beneficiary country (ies) ownership of, and capacity to implement, a funded project or programme |
| E.5.1. Existence of a national climate strategy and coherence with existing plans and policies, including NAMAs, NAPAs and NAPs |
| 135. The programme is fully aligned with key Government policies and strategies.136. The *Second National Communication to the UNFCCC* (2010)[[94]](#footnote-94) notes that Mauritius’s overall greenhouse gas (GHG) emissions are growing by 2.7% per year, and those from the energy and transport sectors specifically by 5.4% and 3.3% per year, respectively. Together, the energy and transport sectors account for 86% of Mauritius’s total greenhouse gas (GHG) emissions of 3.8 MtCO2e.137. As identified by the country’s *UNFCCC Technology Needs Assessment* (2012)[[95]](#footnote-95), solar energy, energy efficiency and energy conservation offer significant potential. The TNA developed methodologies, tools and capacity building for prioritising sectoral technologies, undertaking detailed barrier analysis, and undertaking detailed socio-economic analysis of mitigation technologies; it also developed concept notes for leveraging climate finance to support technology transfer and diffusion. A Cabinet Decision on 16 August 2013[[96]](#footnote-96) took note of the recommendations in the TNA report, including recommendation (f): ‘promotion of the use of renewable energy, reduction of fuel importation and promotion of greenhouse emissions reductions’.138. The Government’s drive to reduce fossil fuel use is reflected in the *Long-Term Energy Strategy 2009-2025*[[97]](#footnote-97). Under this Strategy, the Government has recently announced two key targets:* A renewable energy (RE) target of at least 35% of electricity production by 2025
* The establishment of a dedicated Mauritius Renewable Energy Agency to coordinate the rapid intake of renewable energy

139. With regard to the transport sector, the Government has indicated, in its Action Plan (2015-2019)[[98]](#footnote-98), its intention to proceed with the Bus Modernisation Programme. In addition, the Transport Consensus (2006) remains a guiding document in terms of steps to be accomplished to further improve road transport, including public transport in particular. 140. Since 2011, the *Sustainable Mauritius (Maurice Ile Durable)* concept[[99]](#footnote-99)has provided a long-term vision for promoting sustainable development in Mauritius. The concept covers five areas, namely Energy, Environment, Equity, Education and Economy/Employment. Objectives include: “To increase the resilience of our nation to unpredictable and shifting external factors such as climate change or global crises” and to “promote a climate-resilient development pathway and pursue climate change adaptation and mitigation programmes”.[[100]](#footnote-100) 141. The GCF programme will be implemented by the relevant line Ministries as well as the Central Electricity Board under the guidance of the Programme Board. Refer to Section E.5.3 for details of the consultation process and the support from the various institutions. A large number of domestic stakeholders will also be involved in the programme. In line with the Government’s policy to better involve youth and civil society organisations in national initiatives, the programme will adopt a socially-inclusive approach and a dedicated call for proposals for adoption of 9 MW of rooftop PV panels under the SSDG scheme will be targeted at these groups. The programme is also aligned with the Government’s National Gender Policy Framework.[[101]](#footnote-101) |
| E.5.2. Capacity of accredited entities and executing entities to deliver |
| 142. Please refer to section C.4 for information about the executing entities.143. UNDP has maintained a Country Office in Mauritius since 1974. The Environment & Climate Change Unit is the largest within the Country Office, employing 9 staff and managing a US$ 22 million portfolio. UNDP has excellent high-level and operational-level relations with Government counterparts and assisted the Government in developing the National Climate Change Adaptation Framework in 2013. The GCF programme draws directly from UNDP experience managing a Global Environment Facility project, ‘Removal of Barriers to Solar PV Power Generation in Mauritius, Rodrigues and the Outer Islands’ project[[102]](#footnote-102) (2011-16) and from support provided to the Outer Island of Agalega through the same project; and indirectly from the GEF-financed ‘Removal of Barriers to Energy Efficiency and Energy Conservation in Buildings’ project[[103]](#footnote-103) (2008-14), the SIDSDOCK-financed ‘Energy Efficiency and Renewable Energy in Mauritius’ project (2012-16)[[104]](#footnote-104), and support to the Ministry of Environment and Sustainable Development in developing climate finance expertise[[105]](#footnote-105). The Country Office is backstopped by the UNDP Regional Service Centre in Addis Ababa, which houses 4 climate change and 4 energy technical advisors. |
| E.5.3. Engagement with civil society organizations and other relevant stakeholders |
| 144. The GCF programme has been developed through consultations with the GCF Secretariat. In May 2015, a concept note was provided to the Country Support Team (Ms Chantal Naidoo) by the National Designated Authority. Following Ms Naidoo’s advice, the document was upgraded to a full funding proposal as significant information was available from the participating ministries. In June 2015, following a call with Ms Naidoo, chaired by the NDA, the proposal preparation team was advised to develop a programme rather than a project, given the scope and organisational set-up of the proposal. 145. The GCF programme has been developed through a joint effort of the following stakeholders:* Ministry of Finance and Economic Development
* Ministry of Energy and Public Utilities
* Central Electricity Board
* Energy Efficiency Management Office
* Ministry of Public Infrastructure and Land Transport
* National Transport Authority
* Traffic Management and Road Safety Unit
* National Transport Corporation
* Ministry of Environment, Sustainable Development, Disaster and Beach Management
* Outer Islands Development Corporation
* Ministry of Ocean Economy
* Commercial bus operators
* United Nations Development Programme (Country Office and Regional Service Centre)
* Agence Franҫaise de Développement (AFD)

All of these organisations have endorsed the programme.146. Within the Ministry of Finance and Economic Development, which is also the GCF National Designated Authority (NDA), the Sector Management teams for Energy and Transport as well as the Development Cooperation Section have provided inputs into the funding proposal. The NDA’s Letter of No Objection is provided in Annex Ia. A Letter of Endorsement from the UNFCCC Focal Point is provided in Annex Ib. 147. In the course of project development, the Government team working on the INDC and the CEB team working on the Energy Master Plan (2015-2025) were consulted in view of incorporating the project into both of these documents.148. A Project Appraisal Committee (PAC) was convened on 16 July 2015 to formally assess the programme, to ensure its alignment with national policies, and to propose design changes where necessary. The PAC was attended by 32 individuals, representing a diverse set of Government, private sector and civil society stakeholders. The attendance list and PAC minutes are provided in Annexes VIIa and VIIb. A second, transport-oriented (i.e. Component 4), stakeholder meeting was held on 8 July 2015, with 17 participants (see Annex VIIc). |
| E.6. **Efficiency and Effectiveness**Economic and, if appropriate, financial soundness of the project/programme |
| E.6.1. Cost-effectiveness and efficiency |
| *Describe how the financial structure is adequate and reasonable in order to achieve the proposal’s objectives, including addressing existing bottlenecks and/or barriers; providing the least concessionality; and without crowding out private and other public investment.*149. Detailed financial and economic analyses have been conducted for Component 2 (separate analyses for the grid strengthening and SSDG Phase 3 elements), Component 3 and Component 4. Component 1 involves the establishment and operationalisation of the Mauritius Renewable Energy Agency, and is structured to be an institutional capacity building component; consequently, financial and economic analysis is not considered pertinent for this Component at this stage. In the analyses carried out, all capital costs are deemed to be inclusive of agency and project management costs.150. Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) values have been computed for Component 2 (both elements) and Component 4, and detailed inputs, assumptions and methodologies of these calculations are described in Annex XII. 151. Based on the financial structure and levels of GCF concessionality being requested, FIRR values for Components 2 (both elements) and 4 are higher than the hurdle rate (the weighted average cost of capital – WACC), with positive Financial Net Present Values (FNPVs). While computing the hurdle rate (WACC), suitable values for alternative returns on equity from the perspective of each Component’s executing entity have been considered, along with the cost of debt and the Component’s financing structure. Sensitivity analyses of the project’s FIRR against key input and assumption values have also been conducted for Components 2 (both elements) and 4, to assess the robustness of the Components’ financial returns against unexpected changes to their input variables. FIRR values under sensitivity analyses for Component 4 are good and still above their hurdle rates but, for Component 2 (grid strengthening element), FIRR values are lower than hurdle rates if the feed-in tariff to be paid by CEB or if interest rates on the debt portion of the Component’s financing structure increase. On the other hand, for the SSDG Phase 3 element of Component 2, FIRR values are lower than hurdle rates if feed-in tariffs to be received by project developers from CEB decrease or if interest rates on the debt portion of their financing structure increase. Hence, any increase or reduction in the feed-in tariff for solar projects needs to be carefully weighed by the Government to ensure financial returns to CEB for its grid strengthening investment and financial returns to project developers for their solar PV investments remain attractive. 152. As described in Section D.1, the FIRR values of Components 2 (both elements) and 4 are lower than their hurdle rates (negative NPV and hence financially unviable or not attractive) if the GCF grants are lower than those proposed.153. For Component 3, revenues cover only 5% of the ongoing operating costs and the remaining 95% of operating costs will be covered by Government grants to OIDC. Given the public good nature of this Component, serving a remote and vulnerable community, the concessionality offered by a GCF grant to completely cover the capital costs of the three PV mini-grid installations is critical.154. The proposed financing structure and GCF concessionality being requested for each of the components have been arrived at after careful consideration of other financing options, including debt and private sector financing. For example, in Component 2 (grid strengthening element), the GCF grants being requested amount only to 38.5% of the overall capital costs, with the remainder being financed by a loan from AFD. Similarly, the financing structures of Component 2 (25 MW solar PV under SSDG Phase 3) and Component 4 include loans taken out by private sector implementing agencies and their equity contributions as well. In addition, Component 4 includes a Government subsidy. Hence, private sector and public sector financing are not crowded out but are, rather, built into the financing structures of each of the project’s components, with GCF concessionality being requested only to make otherwise financially unviable investments viable.155. Based on the proposed financial structure and levels of GCF concessionality being requested, EIRR values for Components 2 (both elements), 3 and 4 are higher than the hurdle rate (a discount rate of 10% is considered as the hurdle rate) with positive Economic Net Present Values (ENPVs). Sensitivity analyses of the project’s EIRR against a 20% increase in estimated costs and a 20% reduction in estimated economic benefits have also been conducted for Components 2 (both elements), 3 and 4, to assess the robustness of the Components’ economic returns against unexpected changes to their input variables. EIRR values under sensitivity analyses for Component 2 (25 MW PV element) are still above the discount rate of 10%. For Component 2 (grid strengthening element), EIRR values are still higher than the hurdle rate even if investment costs increase by 20%, but EIRR values drop below the discount rate if estimated economic benefits are reduced by 20%. EIRR values under sensitivity analysis for Component 3 (Agalega mini-grid) are lower than the discount rate of 10%.156. EIRR values of Components 2 (grid strengthening element), Component 3 and Component 4 are lower than their hurdle rates (negative ENPV and hence economically unviable) if the GCF grants are lower than those proposed. However, the EIRR for Component 2 (PV element) is still higher than the hurdle rate without GCF grants, even though the FIRR value is lower than the hurdle rate without the GCF grant for this Component.*Please describe the efficiency and effectiveness, taking into account the total project financing and the mitigation/ adaptation impact that the project/programme aims to achieve, and explain how this compares to an appropriate benchmark. For mitigation, please make a reference to* [*E.6.5 (core indicator for the cost per tCO2eq)*](#SectionE65)*.*157. The project is considered to be highly cost-effective, generating 4.2 million tCO2e of direct and indirect emission reductions over the lifetimes of programme investments at a cost to the GCF of US$ 10.75/tCO2e.  |
| E.6.2. Co-financing, leveraging and mobilized long-term investments (mitigation only) |
| *Please provide the co-financing ratio (total amount of co-financing divided by the Fund’s investment in the project/programme) and/or the potential to catalyze indirect/long-term low emission investment.*158. Co-financing details are provided in Table 2, Section B.1.159. The co-financing ratio of the entire programme is 4.2. If further investments in renewable energy as a result of grid strengthening are taken into account, then the co-financing ratio, including leveraged funds from private investors for another 100 MW on the grid, is 11.8.  |
| E.6.3. Financial viability  |
| *Please specify the expected economic and financial rate of return with and without the Fund’s support, based on the analysis conducted in F.1.*160. The expected financial and economic internal rates of return (FIRR and EIRR) for Components 2 (both elements) and 4 with GCF grants and without GCF grants are shown in Table 11 below.*Table 11: GCF Programme FIRRs and EIRRs*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Project Component** | **FIRR(with GCF Grants)** | **FIRR(without GCF grants)** | **EIRR(with GCF grants)** | **EIRR(without GCF grants)** |
| Component 2(CEB grid strengthening) | 7.13%(hurdle rate 6.55%) | 5.14%(hurdle rate 6.34%) | 11.3%(hurdle rate 10%) | 9.3%(hurdle rate 10%) |
| Component 2(25 MW grid-connected solar PV) | 7.36%(hurdle rate 7.20%) | 3.72%(hurdle rate 8.04%) | 28.1%(hurdle rate 10%) | 17.8%(hurdle rate 10%) |
| Component 3(Agalega mini-grids) | N/A | N/A | 12.8%(hurdle rate 10%) | -15.1%(hurdle rate 10%) |
| Component 4(Fuel-efficient public transport) | 30%(hurdle rate 21%) | 13.7%(hurdle rate 20.7%) | 20.3%(hurdle rate 10%) | 4.1%(hurdle rate 10%) |

161. Please note that, in the absence of guidance from the GCF on the selection of a specific economic discount rate to use in the economic analysis, all proposals supported by UNDP have opted to use a 10% discount rate, in line with the existing practice of multilateral development banks. Should the GCF request that all proposals submitted for review use the same discount rate and that this rate be other than 10%, we will be happy to revise the economic analysis accordingly.*Please describe financial viability in the long run beyond the Fund intervention.*162. Under Component 1, MARENA will be embedded in law and will receive an annual budget from Government. Therefore, unlike a departmental unit which exists only administratively in Government, MARENA is bound to have a long-term future with a specific, if not growing, mandate. The support to the deployment of PV following grid strengthening, as described in Component 2, will be a long-term feature beyond the programme duration of 8 years because IPPs under the SSDG sign 15-year power purchase agreements with CEB. Moreover, as CEB has committed to allowing a greater proportion of intermittent RE on the grid, enabled by the grid strengthening, the presence of intermittent RE will require regular and timely investment in BESS. As for Agalega, contrary to Mauritius, the electrification was carried out by a Government electrical maintenance department, with limited expertise in PV. In the context of the GCF programme, CEB will be fully involved and will, therefore, be able to provide the required expertise and human resources.  In addition, OIDC has committed to investing the savings incurred through the programme in the establishment of a technical maintenance team. In terms of the transport sector, hybrid buses will have a lifetime of a minimum 12 years and therefore, through the programme, the capacity and willingness to move to a long-term cleaner transport alternative will be created. Finally, through consultations carried out during programme preparation, the bus companies and Government have shown great interest in the smart bus system as a means of improving the quality of the services provided, and the GCF can have confidence that long-term landmarks of its investment will be established in the Republic of Mauritius.  |
| E.6.4. Application of best practices |
| 163. Component 1: The promotion of renewable energy should, in principle, be carried out by a dedicated and specialised team, instead of being spread over a number of organisations. MARENA will act as a ‘one-stop shop’ for private sector energy investors, providing a single point of interaction with the Government to obtain information and data, complete necessary paperwork and schedule meetings with relevant parties (such as CEB). This is considered international best practice.[[106]](#footnote-106) 164. Component 2: Grid strengthening will be carried out in accordance with best practice. CEB has a long-established working relationship with Electricité de France, which has considerable experience with grid reinforcement technology. In addition, the procurement of equipment will be carried out through international, competitive tendering processes, thereby guaranteeing CEB with the best available technology at the best value. The call for proposals for rooftop PV installations under the GCF-supported Phase 3 of the SSDG will require that the new installations comply with the Mauritius Grid Code, which is based on international standards. A copy of the Grid Code and an assessment of its conformity with international best practice are provided in Annex XIII (XIIIa, XIIIb, XIIIc and XIIId). 165. Component 3: The implementation of the Agalega PV component in Phase 2 will enable OIDC to benefit from the experience with PV installations and SMEs trained in Phase 1. Competitive tenders will be launched for the supply, installation and commissioning of the three villages’ PV systems, as well as training of the local technicians. Warrantees will also be sought in order to ensure an after-sales service for the expected lifetime of the equipment.166. Component 4: The tenders for buses and smart bus information systems will be designed to be in line with international best practice*.*  |
| E.6.5. Key efficiency and effectiveness indicators  |
| *GCF core indicators* | Estimated cost per t CO2 eq, defined as total investment cost / expected lifetime emission reductions (mitigation only) |
|

|  |  |
| --- | --- |
| (a) Total project financing | US$ 233.81 million  |
| (b) Requested GCF amount  | US$ 45 million  |
| (c) Expected lifetime emission reductions over time  | 4.19 million tCO2eq |
| **(d) Estimated cost per tCO2eq (d = a / c)** | US$ **55.80 / tCO2eq** |
| **(e) Estimated GCF cost per tCO2eqremoved (e = b / c)** | US$ **10.74 / tCO2eq** |

*Describe the detailed methodology used for calculating the indicators (d) and (e) above.*167. The project budget is presented in Table 2, Section B.1.168. The GHG emission reductions are presented in Annex XIIIg.*Please describe how the indicator values compare to the appropriate benchmarks established in a comparable context.* 169. The project is considered to be highly cost-effective, providing 4.19 million tCO2e of emission reductions at a cost to the GCF of US$ 10.74/tCO2e. This is considerably lower than the social cost of carbon estimated by the US Environmental Protection Agency.[[107]](#footnote-107)  |
| Expected volume of finance to be leveraged by the proposed project/programme and as a result of the Fund’s financing, disaggregated by public and private sources (mitigation only) |
| *Table 12: Co-Finance in Phase 1 of the GCF Programme (2016-2018)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **GCF Grant Contribution (US$ millions)[[108]](#footnote-108)** | **Co-Finance Contribution:Public Sector (US$ millions)[[109]](#footnote-109)** | **Co-Finance Contribution:Private Sector (US$ millions)** | **Total Co-Finance (US$ millions)** |
| Component 1: Institutional strengthening for renewable energy | 1.1 | 1.08 |  | 1.08 |
| Component 2: Grid strengthening and PV deployment | 10 | 20 |  | 20 |
| Component 4: Energy-efficient public transport | 7 | 6.35 | 6.92 | 13.27 |
| **TOTAL** | **18.1** | **27.43** | **6.92** | **34.35** |

*Table 13: Co-Finance in Phase 2 of the GCF Programme (2019-2023)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **GCF Grant Contribution (US$ millions)** | **Co-Finance Contribution:Public Sector (US$ millions)** | **Co-Finance Contribution:Private Sector (US$ millions)** | **Total Co-Finance (US$ millions)** |
| Component 2: Grid strengthening and PV deployment | 19 | 140.4 |  | 140.4 |
| Component 3: PV mini-grids on the Outer Island of Agalega | 0.9 | 1.2 |  | 1.2 |
| Component 4: Energy-efficient public transport | 7 | 5.95 | 6.91 | 12.86 |
| **TOTAL** | **26.9** | **147.55** | **6.91** | **154.46** |

*Table 14: Co-Finance in Phases 1 and 2 of the GCF Programme (2016-2023)*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Component** | **GCF Grant Contribution (US$ millions)** | **Co-Finance Contribution:Public Sector (US$ millions)** | **Co-Finance Contribution:Private Sector (US$ millions)** | **Total Co-Finance (US$ millions)** |
| Component 1: Institutional strengthening for renewable energy | 1.1 | 1.08 |  | 1.08 |
| Component 2: Grid strengthening and PV deployment | 29 | 160.4 |  | 160.4 |
| Component 3: PV mini-grids on the Outer Island of Agalega | 0.9 | 1.2 |  | 1.2 |
| Component 4: Energy-efficient public transport | 14 | 12.3 | 13.83 | 26.13 |
| **TOTAL** | **45** | **174.98** | **13.83** | **188.81** |

*Table 15: Leveraged Finance Arising from the GCF Programme[[110]](#footnote-110)*

|  |  |  |
| --- | --- | --- |
| **Component** | **Leveraged Finance** | **Total Leveraged-Finance (US$ millions)** |
| **Source****Public Sector** | **Amount Million (US$)** | **Source Private Sector** | **Amount Million (US$)** |
| Component 1: Institutional strengthening for renewable energy | Government(through annual budget of MARENA) | 2 |   |  | 2 |
| Component 2: Grid strengthening and PV deployment | CEB (replacement of grid batteries over 10 years) | 41.5 | Households and other entities (25 MW) | 30.5 | 322 |
|  |  | Utility-scale IPPs (100 MW additional)  | 250 |
| Component 4: Energy-efficient public transport | Government | 9 | Bus companies (an additional 100 hybrid buses) | 10 | 19 |

 |
| Other relevant indicators (e.g. estimated cost per co-benefit generated as a result of the project/programme) |
| *Table 16: GCF Cost of Co-Benefits*

|  |  |  |  |
| --- | --- | --- | --- |
| **Co-Benefit** | **Parameter** | **Expected Impact of GCF Programme**  | **GCF Cost Per Co-Benefit** |
| Economic | Number of jobs created | 2,500 | GCF US$ 18,000 per green job created |
| Economic | Foreign currency savings | US$ 582 million | US$ 13 of foreign currency savings per GCF US$ |
| Economic | Reduction in Government budget deficit | US$ 105 million | US$ 2.3 reduction in Government budget deficit per GCF US$ |
| Social | ‘Democratisation’ of PV | 4-10 NGOs to benefit from partial funding for PV systems | GCF US$ 11,459 per stakeholder adopting PV |

 |

***\* The information can be drawn from the project/programme appraisal document.***

|  |
| --- |
| F.1. **Economic and Financial Analysis** |
| *Please provide the narrative and rationale for the detailed economic and financial analysis (including the financial model, taking into consideration the information provided in* [*section E.6.3*](#SectionE63)*).**Component 2 (Grid Strengthening Element)*170. The financial analysis methodology for Component 2 (grid strengthening element) involves cash flow projections for costs and revenues to CEB from sale of electricity procured from potential renewable energy installations that can supply intermittent electricity to a newly-strengthened national grid owned and operated by CEB. The resultant FIRR is compared with the WACC (hurdle rate). The key input values and assumptions used in this analysis are explained in detail in Annex XII.171. The grid strengthening (including smart grid installations) element of Component 2 generates economic benefits in several ways. The most important is in the form of incremental cost savings due to the reduced need to import fossil fuel for generating electricity, equivalent to the amount of electricity expected to be generated by the potential new grid-scale solar power projects that can now be integrated into the grid with enhanced capacity. Given that wind power projects have lower potential than solar PV in Mauritius, and the challenges associated with installing wind power projects in the country, for simplicity reasons fossil fuel savings only from potential solar PV installations are considered. 172. In addition, it is well-known worldwide that renewable energy projects provide an incremental addition to the host country’s GDP, by generating direct and indirect jobs. An IRENA report[[111]](#footnote-111) cites a study on the impact of addition of grid-connected solar PV projects to Mexico’s GDP, wherein addition of 20,000 MW of solar PV capacity was estimated to add between $7.9 billion and $28.5 billion to the country’s economy, depending on whether or not local manufacturing of solar panels was involved. Due to the lack of a similar study for Mauritius, these estimated values for Mexico are used in the current analysis, with the chosen value being the most conservative - US$ 3.95 billion (50% of low-end value for Mexico) per 20,000 MW or US$ 0.2 million per MW. 173. Economic costs computed at constant 2015 prices include: (i) capital costs for funding grid strengthening and smart grid installations and (ii) operational costs incurred by CEB. Costs have been budgeted at constant prices; no transfer payments and contingencies are considered. A shadow conversion factor (SCF, the inverse of the shadow exchange rate factor or SERF) of 0.95 has been considered for tradable goods in Mauritius for conversion from financial to economic prices.[[112]](#footnote-112) A shadow wage rate factor (SWRF) has not been considered. Transfer payments and physical contingencies are excluded from the economic analysis. More detailed inputs and assumptions are provided in Annex XII.*Component 2 (25 MW Solar PV)*174. The total 25 MW of grid-connected PV capacity will be developed by non-CEB entities, many of them private sector companies and households. The financial analysis methodology involves cash flow projections for project costs and revenues to the project development entities from sale of electricity generated by their solar power installations (totalling 25 MW) to CEB. The resultant FIRR is compared with the WACC (hurdle rate). The key input values and assumptions used in this analysis are provided in Annex XII.175. This element of Component 2 generates economic benefits in a similar manner to the grid strengthening element – incremental cost savings due to the reduced need to import fossil fuel for generating electricity and incremental additions to the country’s GDP, by generating direct and indirect jobs. Estimation of both these benefits follows the same methodology as that for the grid strengthening element of this Component.176. Economic costs computed at constant 2015 prices include: (i) capital costs for funding solar PV installations, and (ii) operational costs that include the installed capacity’s routine operations and maintenance (O&M) costs. Costs have been budgeted at constant prices; no transfer payments and contingencies are considered. More detailed inputs and assumptions are provided in Annex XII.*Component 3 (Agalega Mini-Grid Solar PV)*177. This Component involves installing solar PV-based mini-grid hybrid systems (300 kW in total), using existing diesel generators acting as back-up, to provide reliable and affordable electricity to 70 households (~300 inhabitants) and public buildings spread over 3 settlements on Agalega’s North and South Islands. Given that the project is intended to provide access to energy to a small, rural population in the outer islands, it is not expected to generate significant financial benefits due to the small monthly fees collected by OIDC from these households for providing electricity. Hence, computing a WACC and FIRR is not pertinent for this Component. However, assessment is conducted to explore the extent to which the monthly fees collected from households covers the project’s operational costs. Based on detailed inputs and assumptions provided in Annex XII, the fees collected by OIDC from households cover about 5% of the ongoing operational costs of the mini-grid systems. The residual 95% of operating costs will be covered by Government grants to OIDC.178. This Component’s primary economic benefit is the incremental avoided cost of diesel due to the replacement of a large fraction (~80%) of existing diesel generator-based power generation capacity by solar power. However, it is well documented that the availability of reliable, clean and affordable electricity to rural households provides a number of additional welfare benefits, such as increases in productivity of home-based businesses, time saved for household chores or leisure, educational benefits to children and the general economic value of access to reliable and high quality lighting and television viewing experiences. These welfare benefits were quantified for a few countries in a 2008 World Bank report.[[113]](#footnote-113) However, this report does not quantify the benefits for Mauritius. Hence, quantified benefit values for the most comparable country, Philippines, are used. Both Mauritius and Philippines are archipelagic countries with similar challenges associated with providing energy access in remote islands.179. Economic costs computed at constant 2015 prices[[114]](#footnote-114) include: (i) capital costs for funding the solar PV mini-grid system, and (ii) operational costs that include the installed capacity’s routine operations and maintenance (O&M) costs and the small cost of diesel that will continue to be used in the back-up generators. Costs have been budgeted at constant prices; no transfer payments and contingencies are considered. More detailed inputs and assumptions are provided in Annex XII.*Component 4 (Energy Efficient Public Transport)*180. The fuel-efficient public transport component includes the provision of subsidies and tax incentives to bus fleet operators in Mauritius. This financial analysis methodology involves cash flow projections for project costs and revenues to bus fleet operators’ transport operations that use the newly-acquired diesel-electric hybrid semi-low-floor buses. The resultant FIRR is compared with the WACC (hurdle rate). The key input values and assumptions used in this analysis are provided in Annex XII.181. Component 4’s primary economic benefit is the avoided cost of diesel due to the replacement of a fraction of existing diesel-powered conventional buses that need to be replaced due to ageing. In addition, the SBIS, which is expected to serve 30,000 passengers during its GCF-supported first-phase deployment, will reduce the waiting and commuting times of these passengers, thereby increasing their productivity. According to a report by a UK-based university transport research team on similar passenger information systems worldwide[[115]](#footnote-115), waiting / commute times are conservatively estimated to decrease by 3-4%. The average value of a 3.5% reduction in passenger waiting / commuting time due to the introduction of the SBIS is used in the analysis. This is quantified as the number of working hours gained per annum, which, in turn, increases productivity, which is quantified as the increase in the country’s GNI per capita.182. Economic costs computed at constant 2015 prices include: (i) capital costs required to purchase 175 hybrid buses between 2016 and 2021, and (ii) operational costs that include the vehicles’ routine operations and maintenance (O&M) costs and other costs associated with operating a fleet of these buses. Costs have been budgeted at constant prices; no transfer payments and contingencies are considered. More detailed inputs and assumptions are provided in Annex XII.*Based on the above analysis, please provide economic and financial justification (both qualitative and quantitative) for the concessionality that GCF provides, with a reference to the financial structure proposed in section B.2.*183. Based on the financial and economic analysis described above, and on the basis of the proposed financial structure and levels of GCF concessionality being requested, FIRR values for Components 2 (both elements) and 4 are higher than the hurdle rate (where the WACC is considered to be the hurdle rate), with positive Financial Net Present Values (FNPVs). EIRR values for Components 2 (both elements), 3 and 4 are higher than the hurdle rate (a discount rate of 10% is considered to be the hurdle rate), with positive Economic Net Present Values (ENPVs). As it is apparent from the FIRR and EIRR values in Section E.6.3, with and without GCF grants for Components 2 (both elements), 3 and 4, it is clear that the concessionality offered by GCF grants is essential to establish financial and economic viability and investment attractiveness for these Components.184. For Component 3, given the public good nature of this Component, serving a remote and vulnerable community, the concessionality offered by a GCF grant to completely cover the capital costs of this installation is critical.185. In addition, the high fiscal deficit of the Government of Mauritius, and the Government’s debt reduction obligations under the Public Debt Management Act (see Section E.4.2), make the requested GCF grants very important to enable the Government to achieve its stated goal of accelerating the country’s shift to a low-carbon economy. |
| F.2. **Technical Evaluation**  |
| *Component 2: Grid Strengthening and PV Deployment*186. Solar PV systems have been chosen for the programme for their cost-attractiveness (falling prices and low operational cost), their speed of implementation and, above all, their public acceptance. Although wind power generation is also an attractive option in Mauritius, its reception in the local context has been rather lukewarm. Two wind farms of 9.3 MW and 29.4 MW are in the pipeline[[116]](#footnote-116) but the projects have been facing difficulties in their execution, especially public opposition.[[117]](#footnote-117) In addition, unlike wind generation, solar PV power generation can be integrated at different voltage levels on the network. Consequently, its deployment is much faster and more straightforward. 187. A technical study carried out by the international consultancy firm, AF-Mercados, in 2014[[118]](#footnote-118) recommended the investment in centralised battery energy storage as a prerequisite to accommodating a higher share of renewable energy on the Mauritian grid. Renewable energy sources of variable nature, such as wind and solar, have a direct impact on the stability of the grid if their power integration is not properly managed. For the integration of variable renewable energy sources, the allocation of spinning reserves on fast-acting conventional generators such as diesel engines, hydro-generators and gas turbines is important. However, such an approach by itself is inadequate for higher penetration of variable RE sources. In this respect, the battery energy storage system, with its very fast response and control flexibility, is a key means of ensuring grid stability. As Mauritius has an insular grid with no interconnections with neighbouring power systems, the need to ensure grid stability prior to the scale-up of renewable energy is paramount (see Annex IIa).*Component 3: PV Mini-Grids on the Outer Island of Agalega*188. As per the findings of the technical assessment carried out under the UNDP-GEF ‘Removal of Barriers to Solar PV Power Generation in Mauritius, Rodrigues and the Outer Islands’ project (Annex IId), the only realistically exploitable renewable sources of energy on Agalega are biomass and solar energy. The North and South Islands benefit from about 2,000 hours of sunshine per year. This abundance of solar energy can be exploited for the production of electricity. By factoring in the increasing domestic load (increase in the number of households with fridges, TV sets and other equipment) and the additional need for cooling during hot days, it is estimated that approximately 300 kW of generation capacity is required on the island with the following load distribution:* Vingt Cinq (main economic hub) – 150 kW
* La Fourche – 75 kW
* Sainte Rita – 75 kW

189. These three villages already have mini-grids powered by diesel generators. Given the generous insolation levels available, hybrid system mini-grids (with a mixture of PV, batteries and diesel as back-up) are the most low-carbon option. Coupled with the appropriate power electronics / transformer (for power quality control and regulation), the hybrid system can easily be retrofitted in the utility space available in each village and ensure sufficient and reliable power at all times of the day and night. 190. The design of the system at the capacity stated above will also ensure that diesel engines are only minimally used while ensuring that energy requirements for cold storage and domestic uses are comfortably met. This will reduce the amount of diesel imported from mainland Mauritius (hence enhancing autonomy) and also improve the quality of life of the inhabitants through reduced noise / emission levels and increased revenue via boosted economic activities. In terms of diesel costs saved, it is estimated that 3 diesel engines (totalling 300 kW) running around the clock with a load factor of 50% will consume 450 litres of diesel daily. This amounts to 164,250 litres per year, representing a total of $200,385 saved per annum. 191. The cost per kWp for a solar PV system is currently ~US$ 2,000. In the context of Agalega, since there is no need to invest in diesel generators, grid infrastructure or civil works, the cost of the total 300 kWp will be ~$2,000/kWp, amounting to US$ 600,000 in total investment. *Component 4: Energy Efficient Public Transport* 192. The diesel-electric hybrid semi low-floor buses that will be supported through the GCF programme combine a conventional diesel internal combustion engine with an electric motor that is recharged by the engine and from energy generated during braking – energy that would otherwise be wasted as heat. This hybrid technology has been chosen following detailed discussions with all of the bus operators as it is known to be a mature technology that has been successfully trialed in other cities[[119]](#footnote-119). Its advantages are as follows:* It does not require the use of an alternative fuel, which would imply import, storage and distribution issues.
* It has comparable, if not higher, environmental benefits than alternative technologies or energy uses.[[120]](#footnote-120)
* It has replication potential within the freight transport sector due to noteworthy savings in fuel consumption.
* It has significantly lower incremental costs than electric buses, which offer lower emissions but cost 300% more than conventional buses.

193. CO2 emission savings from diesel-electric hybrid vehicles vary according to what extent the electric motor is used. This is strongly dependent on the duty cycle, and is affected by aspects such as the topography of the route, congestion and driver efficiency. Much higher savings can be achieved in urban environments due to frequent speed changes. On average, CO2 reductions of 40% can be expected. Reductions in local emissions of NOx, NMHC and PM are directly linked to reduced diesel consumption and can be up to 35% lower. It is generally agreed that noise emissions from diesel-electric hybrids are up to around 3 decibels lower than conventional buses. |
| F.3. **Environmental, Social Assessment, including Gender Considerations** |
| 194. The programme has completed the UNDP social and environmental screening procedure (see SESP attached as Annex VI). This screening was undertaken to ensure the programme complies with UNDP’s Social and Environmental Standards. UNDP’s Social and Environmental Standards were reviewed by the GCF Accreditation Panel and deemed sufficient to accredit UNDP to submit low- and medium-risk projects.195. The overall social and environmental risk category for this programme is: **moderate**.196. Specific project risks are listed in Section G below, together with appropriate mitigation measures. Given the type and scale of the rooftop PV systems and fuel-efficient hybrid buses addressed by the programme, these technologies are exempted from the EIA requirements of Mauritius under the Environmental Protection Act (EPA, 2002 - amended 2008)[[121]](#footnote-121) – see Annex VIb. The impacts of rooftop solar PV systems are considered moderate as they are site-specific, temporary (e.g. installation and decommissioning), and can be easily mitigated by proper siting, technical specifications, and design and construction standards. Some considerations in selecting sites for the rooftop solar PV systems will include: (i) proximity to the existing power transmission system (i.e. grid connection), (ii) the integrity of the building (i.e. its capacity to hold additional load, to maintain roof water-tightness, etc.); (iii) existing land use in the area; (iv) local climate (i.e. the solar resource, the variability in cloud cover, windspeed, precipitation, etc.), and (v) accessibility (i.e. proximity to existing roads).197. However, as provided for in Part IV of the EPA, the medium-scale PV systems enabled by the programme will be subject to EIAs and the submission of environmental monitoring plans prior to start of works (Section 18(2)(l) of EPA 2002). In the case of medium-scale greenfield PV systems, all the relevant Government permits (i.e. electrical, civil, building, etc.) will be obtained prior to installation of the PV systems.198. Various technical standards and specifications for solar PV systems established by the International Electro-technical Commission (IEC), the Institute of Electrical and Electronics Engineers (IEEE), and other recognised standard-setting organisations will be referred to in order to ensure a degree of reliability and safety of operation, minimising the risk of system failure.199. Several capacity-building and employment opportunities are incorporated in the design of the programme that will have female participation. 200. Consultations with stakeholders will continue throughout the programme cycle. A programme-level grievance redress mechanism that is gender-sensitive following UNDP’s SES[[122]](#footnote-122) will be set-up to deal with any potential complaint or grievance. A programme brief (i.e. a one-page flyer or FAQ) that will include the contact details of person(s) designated to receive complaints and suggestions will be made available to the public on the programme website and from the offices of UNDP and the executing entities. A record of compliance with applicable Government regulations will be submitted annually by executing entities to UNDP. Documentation of any complaint received by executing entities will also be submitted to UNDP.*Table 17: Gender Analysis*

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| **No** | **Project Component Name** | **Gender Analysis** |
| 1 | Institutional strengthening for renewable energy | These components of the project will benefit the entire country and thus they are not biased against any gender.In fact, the Constitution of Mauritius guarantees the equality of all citizens and the respect of fundamental rights and freedom. In 1995, the Constitution was amended to make sex discrimination illegal. The recent adoption of an Equal Opportunities Act[[123]](#footnote-123) in Mauritius constitutes an important step in the fight against sexual discrimination, by providing protection against sexual harassment and victimisation. |
| 2 | Grid strengthening and PV deployment |
| 2 | Grid strengthening and PV deployment | Under these components, renewable energy and fuel efficiency projects will be conducted. Apart from public institutions, calls for proposals will be launched to encourage participation:1. From the private sector, NGOs and households for the rooftop PV projects; and
2. Private-sector bus companies.

The calls for proposals and the evaluation criteria will not be biased towards any gender.It is to be noted that women in the Republic of Mauritius have identical access as men with regard to inheritance. Widows and widowers inherit the property of the deceased spouse, whatever the circumstances and the matrimonial regime, even if the deceased did not leave a written will. There are no legal or customary restrictions that favour male heirs over females.With respect to ownership of property other than land, women are treated equally with men under the the law with respect to their legal rights to conclude contracts and administer property without the interference or consent of a male partner. There are no indications that Mauritian women face discrimination with regard to access to credit, such as bank loans. In a marriage under the community of property regime, either spouse must have their partner’s consent to obtain a loan. Several measures have also been taken to ease the process of women’s access to credit. The Development Bank of Mauritius (DBM) is also more flexible in its provision of developmental assistance for projects for women. A woman's specific situation (e.g. living separately from her husband or being in the process of divorce) is not an obstacle for her to take loans and start a business.Legally, men and women have equal rights with respect to economic opportunities, political participation, land tenure, property ownership, marriage and family. |
| 3 | PV mini-grids on the Outer Island of Agalega |
| 4 | Energy-efficient public transport |

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| F.4. **Financial Management and Procurement** |
| 201. The programme will be executed under the UNDP National Implementation Modality (NIM). National implementation is used when there is adequate capacity in the national authorities to undertake the functions and activities of the project. UNDP will ascertain the national capacities of the implementing partners by undertaking an evaluation of capacity following the Framework for Cash Transfers to Implementing Partners (part of the Harmonised Approach to Cash Transfers – HACT).202. The implementing partner may follow its own procedures provided they conform to the UNDP Financial Regulations and Rules and Principles (see full details available at <https://info.undp.org/global/popp/ppm/Pages/Legal-Framework.aspx>.) The implementing partner may alternatively apply UNDP practices. 203. The UNDP Country Office may mobilise certain inputs on behalf of the implementing partner. In this case, UNDP establishes the contracts following UNDP rules and procedures, as well as the policies for Country Office support services. UNDP is then a Responsible Party for the provision of support services. Inputs are the personnel, goods, services and grants that are necessary and sufficient to produce the planned outputs. Inputs are obtained on the basis of the programme work plan and the corresponding budget. Where the progress towards planned outputs is not advancing as expected, the Programme Board shall review the strategy of the programme, including the work plan, budget and inputs.204. Programme funds are financial resources mobilised from various sources to be used for programme expenditures, as defined in the programme budget. Programme financial arrangements must be planned in this process, which may include funding from UNDP regular resources, Government cost-sharing, donor contributions, trust fund financing, etc. 205. According to the NIM modality, the Implementing Partner will need to have a bank account opened for the programme through the Accountant General at the Bank of Mauritius or a commercial bank. Authorised signatories must be provided to the UNDP Country Office. 206. Based on the approved budget in the Project Document, an Annual Work Plan (AWP) is prepared and signed at the start of each year. The Programme Manager must ensure that the expenditures are made in line with the approved AWP. However, when deliverables are delayed and expenses not incurred in due course, the Programme Manager may revise the budget during the year. Budget Revisions are recorded in ATLAS by the UNDP Country Office and the revised AWP is signed again.207. Each quarter, the implementing partner may request for funding through the Financial Report, which has to be submitted to UNDP. Under the Financial Report, the expenses are captured based on their account codes, which UNDP shall provide to the Programme Manager. The UNDP Country Office captures all expenses in its system (ATLAS) to monitor the progress of the funding and also to see whether the Implementing Partner is adhering to the planned budget. The Implementing Partner makes a request for cash advance based on its quarterly work plan and budget. The cash advance is used by the Implementing Partner to meet its quarterly expenses as per the planned budget.208. On a quarterly basis, a financial report is prepared by the Programme Manager, signed by the National Programme Director and submitted to UNDP in order to report on expenditure in the previous quarter and request for funding for the forthcoming quarter. Nevertheless, if all the funds, or 80% of the funds advanced in the previous quarter, are not utilised, the cash advance is not processed for the forthcoming quarter. The Financial Report contains all the expenditures made by the Implementing Partner during the quarter aligned through its respective activities as per the AWP and Chart of Accounts which the UNDP Country Office provides to the Programme Manager. The Financial Report is scrutinised by the Programme Officer/ Programme Manager at the UNDP Country Office and submitted for signature by the UNDP Resident Representative. The request for cash advance is made while submitting the Financial Report, which must be approved and signed by the National Programme Director and the UNDP Resident Representative after having been vetted by the programme officer in charge of the project.*Audit*209. National implementation programmes have to be audited at least once in the life of the programme, and each year that it is considered appropriate by the Country Office (depending on level of delivery, difficulties found during the year, etc.). The funds advanced to the programme are under the total responsibility of the Implementing Partner and must only be used for the activities and inputs stated in the annual work plan, and following UNDP’s policies and procedures as referred to in the project document. The Implementing Partner / programme must have a good system of accounting recording and appropriate filing of financial documentation on the programme (in order to maintain records of all payments made with advances and original expenditure back-up documentation). All of these requirements and information will be reviewed at the programme site during the programme audit.*Government Procurement*210. In general, procurement of services and goods related to all major development projects/programmes of a public nature in Mauritius has to follow the Public Procurement Act 2006 and other associated procurement regulations (complete information is available at <http://publicprocurement.govmu.org/>). With regard to Component 2, CEB shall use its usual processes for both procurement and contract management in order to ensure effective operational arrangements with prospective counterparties.211. Public Procurement in Mauritius is governed by the Public Procurement Act 2006 (PPA). After the proclamation of the PPA in 2008, public procurement has been performed under a framework based on a three-tier structure: (i) a Procurement Policy Office (PPO) exercising oversight through compliance monitoring and evaluation; (ii) a Central Procurement Board (CPB) with the responsibility to approve awards of public contracts above prescribed thresholds; and (iii) an Independent Review Panel (IRP) to settle procurement grievances. This structure aims to achieve value for money and deliver quality public services with integrity, accountability, legality and transparency. |

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| G.1. **Risk Assessment Summary** |
| 212. The programme has been screened according to UNDP’s Social and Environmental Procedure and the following potential risks have been identified. The small-scale rooftop PV systems and fuel-efficient hybrid buses addressed by the programme are exempted from the EIA requirements of Mauritius under the Environmental Protection Act (EPA, 2002 - amended 2008) – see Annex VIb. Only medium-scale PV systems will require an EIA and an environmental monitoring plan, which will be the responsibility of successful IPP bidders to undertake. Issuance of a power generation licence will be subject to an EIA and environmental monitoring plan being approved by the Ministry of Environment, Sustainable Development and Disaster and Beach Management.213. The risks identified in the ESIA analysis are as follows:* Delay in procurement of necessary technical assistance for the various components: Moderate
* Duty-bearers may not have the capacity to meet their obligations to the programme: Moderate
* Potential for the programme to reproduce discrimination against women’s participation: Low
* Vulnerability to climate change: Moderate
* Vulnerability to geological hazards such as earthquakes: Low
* Transport, installation and decommissioning of the PV systems on rooftops may pose potential safety risks to local communities and workers: Low
* Potential failure of structural elements of rooftop PV systems can pose risks to communities: Low
* Potential for increased vehicular emissions from public transit: Low
* Generation of waste: Moderate

214. Based on the above, the maximum risk category is Moderate and, therefore, the risk category for the overall programme is Moderate. Section G.2 below considers the risk mitigation measures required for the smooth operation of the programme.  |

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| **G.2. Risk Factors and Mitigation Measures** |
| *Please describe financial, technical and operational, social and environmental and other risks that might prevent the project/programme objectives from being achieved. Also describe the proposed risk mitigation measures.* |
| **Selected Risk Factor 1**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Delay in procurement of necessary technical assistance for the various components.  | Technical and operational | Low (<5% of project value) | Medium |
| Mitigation Measure(s) |
| The UNDP Country Office will put its procurement processes at the disposal of the Government of Mauritius. Under the National Implementation Modality, UNDP may undertake procurement for Government based on a Letter of Agreement and UNDP’s Cost Recovery Policy. In general, UNDP procurement timelines are shorter than Government procurement schedules. |
| **Selected Risk Factor 2**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Duty-bearers may not have the capacity to meet their obligations to the programme. | Social and environmental | Low (<5% of project value) | Medium |
| Mitigation Measure(s) |
| Programme elements will include: (i) the establishment of the Mauritius Renewable Energy Agency, which will be responsible for promoting and facilitating the expansion of the RE sector; (ii) development of additional relevant legislation, and (iii) training to Government and the private sector (notably SMEs) on solar PV. These elements are expected to increase stakeholders’ capacities. Capacity building will take place for the Mauritius Renewable Energy Agency, thereby empowering it to meet its responsibilities fully. |
| **Selected Risk Factor 3**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Potential for the programme to reproduce discrimination against women’s participation. | Social and environmental | Medium (5.1-20% of project value) | Low |
| Mitigation Measure(s) |
| * Gender-disaggregated data will be used for monitoring outputs, outcomes and impacts during programme implementation to ensure women’s participation in capacity building and employment opportunities.
* Capacity-building elements incorporated in the programme design that will have female participation are: (i) Component 1 will ensure gender balance (as appropriate) in the recruitment of Mauritius Renewable Energy Agency staff as well as in the dedicated training on programme development; (ii) Component 2 will offer training to the private sector (with a particular focus on SMEs) in the installation, operations and maintenance of PV systems; (iii) Component 3 will offer gender-sensitive training on the use of renewable energy to OIDC staff and selected inhabitants of Agalega; and (iv) Component 4 will offer training in the operation and maintenance of hybrid buses.
 |
| **Selected Risk Factor 4**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Vulnerability to climate change. | Social and environmental | Medium (5.1-20% of project value) | Medium |
| Mitigation Measure(s) |
| * Site selection will include locations with good insolation characteristics and where there are minimal hindrances to PV functioning.
* The programme will consider PV modules with a higher temperature coefficient if most sites available are expected to have high temperature increases or experience significant heat waves.
* Specifically for Agalega, the programme will consider taking out catastrophic or performance guarantee insurance to protect against degradation.
* Also specifically for Agalega, a maintenance plan will be devised for OIDC and its implementation monitored until the end of the programme through bi-annual site visits by the Programme Coordinator and the Component 3 Project Manager.
* EIAs will be prepared by IPPs for medium-scale solar PV systems following the requirements of EPA 2002 (amended 2008).
 |
| **Selected Risk Factor 5**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Vulnerability to geological hazards such as earthquakes. | Social and environmental | Low (<5% of project value) | Low |
| Mitigation Measure(s) |
| * Structural integrity will be a major criterion in determining the suitability of a building for a rooftop solar PV system to ensure it can support the weight of the system (including ‘dead load’).
* Design of rooftop PV systems will incorporate applicable national structural engineering, construction and technical standards and/or international standards such as those from IEC, IEEE, ASTM, UL, etc.
* For the medium-scale PV systems, EIAs will be prepared as required by EPA 2002 (amended 2008).
 |
| **Selected Risk Factor 6**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Transport, installation and decommissioning of the PV systems on rooftops may pose potential safety risks to local communities and workers. | Technical and operational | Medium (5.1-20% of project value) | Low |
| Mitigation Measure(s) |
| * A safety management plan will be required from the developer / EPC contractor(s) and sub-contractor(s), and will be implemented and monitored for compliance during construction and decommissioning.
* Workers will have orientation and regular training on safe working at height.
* Personal protective equipment will be provided to workers.
* Clear warning / danger signs will be installed to alert local communities of PV installation / decommissioning work.
 |
| **Selected Risk Factor 7**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Potential failure of structural elements of rooftop PV systems can pose risks to communities. | Technical and operational | Medium (5.1-20% of project value) | Low |
| Mitigation Measure(s) |
| * Rooftop site selection criteria will include the presence of trees adjacent to the building.
* The developer / EPC contractor / sub-contractor will be required to ensure that only certified electrical contractors with experience in PV systems are allowed to install the solar units.
* Prominent warning signs will be installed at designated locations so that persons, particularly those with disabilities, are able to recognise the potential danger.
* A regular maintenance and cleaning programme for the solar panels will be implemented to ensure no debris accumulates beneath the panels; trimming of nearby trees (if trees cannot be avoided) will ensure a safe distance from the panels; and inspection of wiring and cables.
* A safety management plan will be required from the developer / EPC contractor(s) and sub-contractor(s) and will be implemented throughout the project cycle.
 |
| **Selected Risk Factor 8**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Potential for increased vehicular emissions from public transit. | Social and environmental | Medium (5.1-20% of project value) | Low |
| Mitigation Measure(s) |
| * Capacity building in Component 4 will include a training programme for bus drivers on fuel-efficient driving and inspection / maintenance of energy-efficient buses; and information dissemination to create awareness, educate and to cause behavioural transition. Periodic retraining will be incorporated to ensure that drivers do not slip back into inefficient driving practices.
* The programme will require that the 175 fuel-efficient hybrid buses maintain a record of compliance with GN 17 of 1997 (noise regulation) and GN 105 of 1998 (ambient air quality standards).
 |
| **Selected Risk Factor 9**  |
| Description | Risk category | Level of risk | Probability of risk occurring |
| Generation of waste. | Social and environmental | Low (<5% of project value) | Medium |
| Mitigation Measure(s) |
| * Programme EPC contractor(s) and sub-contractor(s) will be required to prepare and implement a waste management plan, which will include measures such as segregation at source, 3Rs, and for manufacturers to take back PV panels either at the end of their lifetimes or as they are replaced. Good housekeeping during construction will be strictly implemented. This provision will be included as one of the special conditions in the bid documents.
* All recyclable wastes, including damaged solar panels and metal racks, will be sorted at source and properly collected for recycling while biodegradable wastes will be composted. Other solid wastes and non-compostable wastes will be collected and disposed of following the requirements of the Local Government Act 2011, and Local Government Regulations 2003 and 2004.[[124]](#footnote-124)
* EIAs will be prepared for the medium-scale PV systems following the requirements of EPA 2002 (amended 2008).
 |

H.1. **Logic Framework**.

Please specify the logic framework in accordance with the GCF’s [Results Management Framework](http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.2_RMF.pdf) and [Performance Measurement Framework](http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf).

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| **H.1.1. Paradigm Shift Objectives and Impacts at the Fund level[[125]](#footnote-125)** |
| **Paradigm shift objectives** |
| *Choose appropriate expected result* | Please elaborate on the paradigm shift objectives to which the project/programme contributes. |
| **Expected Result** | **Indicator** | **Means of Verification (MoV)** | **Baseline** | **Target** | **Assumptions** |
| Mid-term (if applicable) | Final |
| **Fund-level impacts** |
| *M1.0 Reduced emissions through increased low-emission energy access and power generation* | *Tonnes of carbon dioxide equivalent (tCO2eq) reduced or avoided as a result of Fund funded projects/ programmes**Cost per t CO2eq decreased for all Fund-funded mitigation projects/ programmes* | Mid-Term and Final Evaluation Reports to have dedicated sections on CO2 emission reductionsDigest of Environment Statistics | 0 | 24,240 (direct) | 162,400 (direct)484,800 (indirect) | * Estimation over lifetime of programme (8 years) and not equipment lifetime
* CEB meets it target of 185 MW installed capacity during programme lifetime
* Mid-term is end-2019
 |
| *M2.0 Reduced emissions through increased access to low-emission transportation* | *Tonnes of carbon dioxide equivalent (tCO2eq) reduced or avoided as a result of Fund funded**Cost per Tonnes of carbon dioxide equivalent (tCO2eq) reduced or avoided as a result of Fund funded* | Mid-Term and Final Evaluation Reports to have dedicated sections on CO2 emission reductionsDigest of Environment Statistics | 0 | 15,250 (direct) | 45,616 (indirect) | * Estimation over lifetime of programme (8 years) and not equipment lifetime.
* Midterm at end 2019
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| **H.1.2. Outcomes, Outputs, Activities and Inputs at Project/Programme level** |
| **Expected Result** | **Indicator** | **Means of Verification (MoV)** | **Baseline** | **Target** | **Assumptions** |
| Mid-term (if applicable)  | Final |
| **Project / programme outcomes** | **Outcomes that contribute to Fund-level impacts** |
| M5.0 Strengthened institutional and regulatory systems | Institutional and regulatory systems that improve incentives for low-emission planning and development and their effective implementation | Legal textGovernment budgetBuilding and staff contracts | No Renewable Energy Agency (MARENA) | Legislation Enacted | MARENA in operation | Government remains committed to establishment of MARENA |
| M6.0 Increased number of small, medium and large low-emission power suppliers | Proportion of low-emission power supply in a jurisdiction or market | CEBDigest of Energy Statistics | 20% | 28% | 35% | Grid strengthening completed |
|  | Number of households, and individuals (males and females) with improved access to low-emission energy sources | CEBDigest of Energy Statistics | 83,000 | 100,000 | 129,500 | Based on estimate of low-emission MW divided by effective capacity of the power system, multiplied by total number of households in Mauritius and Rodrigues (396,335) |
| M8.0 Increased use of low-carbon transport | Number of additional female and male passengers using low-carbon transport as a result of Fund support. | NTA | 0 | 60,000 | 100,000 | New comfortable hybrid semi low-floor buses deployed  |
|  | Vehicle fuel economy and energy source as a result of Fund support. | NTA / Bus companies | 33-38.5 litres per 100km | 33 litres per 100km | 30 litres per 100km | 175 hybrid semi low-floor buses on the road by 2020 |
| **Expected Result** | **Indicator** | **Means of Verification (MoV)** | **Baseline** | **Target** | **Assumptions** |
| **Mid-term** | **Final** |
| **Project / programme outputs** | **Outputs that contribute to outcomes** |
| **PHASE ONE (2016-2018)** | **2015** | **2017** | **2018** |  |
| 1.1 Institutional strengthening of the Mauritius Renewable Energy Agency | Renewable Energy Agency Act in placeInstitution staffed by mid-term | Legislation available on Supreme Court websiteStaff contracts | No legislation,no staff contracted | Legislation voted in Parliament | MARENA functioning as a fully-fledged agency | Government maintains policy of promoting RE |
| 1.2 Assistance to GCF accreditation for CEB and MEPU | MARENA and MEPU submit accreditation requests to GCF | Accreditation Documentation | No Accreditat-ion  | Capacity Assess-ment and training initiated | Accreditat-ion request submitted | CEB and MEPU provide full collaboration at different steps and national systems are sufficient to achieve accreditation  |
| **Expected Result** | **Indicator** | **Means of Verification (MoV)** | **Baseline** | **Target** | **Assumptions** |
| **Mid-term** | **Final** |
| **PHASE ONE (2016-2018)** | **2015** | **2017** | **2018** |  |
| 2.1 Grid strengthened to accept 150 MW intermittent RE | Software purchasedBattery energy storage system procured | Software licencePhysical check for batteries | No AGC software installedNo batteriesGrid able to accept 60 MW | AGC software and batteries purchased and installedGrid able to accept 100 MW | All equipment installed and grid able to accept additional 185 MW  | Government maintains policy of promoting RE |
| 2.2 Smart grid | Smart meters installed in SSDG Phase 3 sites and management measures in place  | Physical verification and report on installation of the meters | No smart meters in Mauritius | 3,900 meters installed and capacity building initiated  | Long-term smart grid strategy developed | Government acknowledges the power stability benefits of smart grids and is keen to invest further |
| **Expected Result** | **Indicator** | **Means of Verification (MoV)** | **Baseline** | **Target** | **Assumptions** |
| **Mid-term** | **Final** |
| **PHASE TWO (2019-2022)** | **2019** | **2021** | **2023** |
| 2.3 Support to PV deployment | Specifications defined for the calls for proposalsActual MW installed by category (gender- disaggregated data) | Calls for proposal documentsAnnual Report of CEB | 2.94 MW PV under Phases 1 and 2 of the SSDG25 MW utility-scale PV on the grid | 14 MW SSDG65 MW PV utility-scale | 27.94 MW SSDG130 MW PV utility-scale | Price of fossil fuels does not fall markedly in the medium-term |
| 3.1 PV mini-grids on the outer island of Agalega | Equipment procured and shipped to AgalegaInstallation of equipment Training programme for OIDC and local inhabitants | Tender documentation and installation reportTraining programme documentation | Existing systems are not functionalElectricity from diesel generators | PV panels and batteries procured and shipped | PV systems fully operational and 300 inhabitants supplied with electricity from PV | OIDC is able to provide the budget for long-term maintenance and is supported by the Ministry of Ocean Economy |
| **Expected Result** | **Indicator** | **Means of Verification (MoV)** | **Baseline** | **Target** | **Assumptions** |
| **Mid-term** | **Final** |
| **PHASE ONE (2016-2018)** | **2015** | **2017** | **2018** |  |
| 4.1 Integrating fuel efficiency in the Bus Modernisation Programme | Hybrid buses procured by bus operatorsManual on clean buses developed | Physical verificationRegistration documentsManual available | Diesel semi low-floor buses being used for bus replacement | 50 hybrid semi low-floor buses on the road | 90 hybrid semi low-floor buses on the road | Hybrid diesel-electric buses are within the price range required for support |
| **PHASE TWO (2019-2022)** | **2019** | **2021** | **2023** |  |
| 4.1 Integrating fuel efficiency in the Bus Modernisation Programme | Hybrid buses procured by bus operators | Physical verificationRegistration documents | 90 hybrid semi low-floor buses on the road | 110 hybrid semi low-floor buses on the road | 175 hybrid semi low-floor buses on the road | Hybrid buses show in Phase 1 that they are effective and can be used in the Mauritian context. |
| **PHASE ONE (2016-2018)** | **2015** | **2017** | **2018** |  |
| 4.2 Supporting the deployment of the Smart Bus Information System | GPS and software installed on busesBus shelters equipped Management organisation clearly defined  | Specifications and registration documents | No bus shelters equipped with GPS or other equipmentOrganisat-ional set-up in the process of definition  | Bus shelters and buses along 3 routes equipped Organisat-ional set-up finalised | System is operational and results in an Increase in bus use along the 3 routes by 9% (Equivalent to an additional 3,000 passengers per day) | Government sets up an efficient organisation capable of managing the system (IT, human resources, budget, equipment) |
| **Activities** | **Description** | **Inputs** | **Description** |
| 1.1.1 Preparation of legislation  | Drafting of legislation / regulations/standards | Technical assistance | Hiring of consultants to assist in preparation of legislation and defining the terms of the Agency |
| 1.1.2 Capacity building for MARENA staff | Training programme  | Technical assistance | Definition of the requirements of MARENA and deployment of the training programme  |
| 1.2.1 Accreditation support | Capacity assessment and training to enable CEB and MEPU to apply to GCF for accreditation | Technical assistance | Hiring of specialist consultants to enable CEB and MEPU to become accredited.  |
| **Activities** | **Description** | **Inputs** | **Description** |
| 2.1.1 Installation of AGC system by CEB  | AGC software is purchased, installed and commissioned by CEB | Funds provided to CEB | Following competitive tender and based on technical specifications of Mercados report, CEB financially supported for the purchase of AGC software |
| 2.1.2 Battery energy storage system installed | Batteries and equipment installed at strategic locations by CEB | Funds provided to CEB | Following competitive tender and based on technical specifications of Mercados report, CEB procures batteries and equipment  |
| 2.1.3 Training programme | CEB staff trained in use of AGC software and maintenance of equipment installed under the project | Funds provided to CEB | Supplier of software and equipment to provide training to relevant CEB staff |
| 2.2.1 Smart meter deployment | Tender documents prepared and 1,000 smart meters procured  | Funds provided to CEB | Smart meters procured and installed at the selected location |
| 2.2.2 Capacity building on smart grid management  | Training programme on smart grid management  | Funds provided to CEB | CEB staff trained by supplier of smart grids in using the system and maintaining it |
| 2.2.3 Long-Term Smart Grid Strategy developed | Plan for expansion of smart metering to other parts of the island  | Technical assistance | Hiring of consultants to review the system and develop a long-term plan for further smart grid implementation |
| 2.3.1 Call for proposals for NGOs and household**s** | Criteria defined for call for proposals in view of expansion of SSDG scheme based on financial evaluation of cost-effective modality for partial investment grants | Technical assistance and funds provided  | Consultant hired to define call for proposals to be launched by CEB. UNDP Small Grants Programme to assist if needed  |
| 2.3.2 Call for proposals for private sector | Criteria defined for call for proposals in view of expansion of SSDG scheme based on financial evaluation of cost-effective modality for partial investment grants | Technical assistance and funds provided | Tender documents prepared by CEB and proposals invited for partially-supported medium-scale PV installations. |
| 2.3.3 Expansion of PV usage on public buildings  | In collaboration with MEPU and relevant stakeholders, CEB to select public buildings for installation of PV panels | Technical assistance and funds provided | CEB to prepare specifications and consultant to be hired to supervise installation of the PV panels |
| **Activities** | **Description** | **Inputs** | **Description** |
| 3.1.1 Procurement and shipping of PV panels and batteries to Agalega | Preparation of tender documents, and specifications for purchase and shipping of PV panels and associated equipment to Agalega | Technical assistance and funds provided to OIDC | Consultant to be hired for the Outer Island Development Corporation to supply and deliver PV panels and equipment |
| 3.1.2 Commissioning of PV systems and training of local inhabitants | Equipment to be installed at Agalega, and commissioned to provide 300 inhabitants with 24-hour supply of electricity | Technical assistance | Supplier to commission PV system |
| 3.1.3 Training of local inhabitants and OIDC staff | Local inhabitants and OIDC staff trained to maintain the PV panels and associated equipment  | Technical Assistance | Supplier to deliver training to Agalega inhabitants |
| **Activities** | **Description** | **Inputs** | **Description** |
| 4.1.1 Selection of hybrid buses, including spare parts | Bus companies on the smart bus system modify their specifications and procure diesel hybrid semi low-floor buses for deployment on the three selected bus routes | Technical assistance  | Consultant hired to assist in the development of a manual to select buses appropriate for the local context |
| 4.1.2 Capacity building for operation and maintenance of hybrid buses | Government staff and bus companies’ staff trained in the operation and maintenance of hybrid buses for optimum long-term performance | Technical Assistance | Consultants hired to provide technical training on hybrid bus O&M |
| 4.1.3 Procurement of hybrid buses on an annual basis | Bus companies procure diesel hybrid semi low-floor buses through a competitive tendering process | Funds  | Funds provided to the Bus Modernisation Programme to address price differential on purchase of hybrid buses |
| 4.2.1 Smart buses: buses equipped with GPS devices | Buses equipped with GPS devices | Technical assistance and funds | The bus companies will be assisted in the procurement of compatible GPS software for the system  |
| 4.2.2 Smart bus shelters / stops | Digital boards installed on bus shelters / stops | Technical assistance and funds | The Ministry of Public Infrastructure and Land Transport will receive financial assistance for the first 3 bus routes, subject to a commitment for further deployment at national scale for the installation of relevant equipment at smart bus shelters. Bus shelters to be equipped and powered by PV panels  |
| 4.2.3 Electronic system (Smart Bus Information System, SBIS) | This system will be the main application that will be hosted on a central server and which will provide accurate information about bus arrivals. Web application / mobile apps that allows checking of bus information, such as schedules and bus arrival time at specific bus stops | Technical assistance and funds | Consultant hired to design and install software for the management of the SBIS. Staff hired by the Government to operate the SBIS.  |

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| H.2. **Arrangements for Monitoring, Reporting and Evaluation** |
| 215. Programme-level monitoring and evaluation will be undertaken in compliance with the UNDP POPP and the UNDP Evaluation Policy. The role of the Programme Director is defined in Section C.7. 216. The primary responsibility for day-to-day project monitoring and implementation rests with the Programme Manager. The Programme Manager will develop annual work plans to ensure the efficient implementation of the programme. The Programme Manager will inform the Programme Board and the UNDP Country Office of any delays or difficulties during implementation, including the implementation of the M&E plan, so that the appropriate support and corrective measures can be adopted. The Programme Manager will also ensure that all project staff maintain a high level of transparency, responsibility and accountability in monitoring and reporting project results. 217. The UNDP Country Office will support the Programme and Project Managers as needed, including through annual supervision missions. The UNDP Country Office is responsible for complying with UNDP project-level M&E requirements as outlined in the UNDP POPP. Additional M&E and implementation quality assurance and troubleshooting support will be provided by the UNDP Regional Technical Advisor as needed. The project target groups and stakeholders, including the GCF NDA, will be involved as much as possible in project-level M&E. 218. A programme inception workshop will be held after the UNDP project document has been signed by all relevant parties to: a) re-orient programme stakeholders to the programme strategy and discuss any changes in the overall context that influence programme implementation; b) discuss the roles and responsibilities of the programme team, including reporting and communication lines and conflict resolution mechanisms; c) review the results framework and discuss reporting, monitoring and evaluation roles and responsibilities and finalise the M&E plan; d) review financial reporting procedures and mandatory requirements, and agree on the arrangements for the annual audit; e) plan and schedule Programme Board meetings and finalise the first year annual work plan. The Programme Manager will prepare the inception report no later than one month after the inception workshop. The final inception report will be cleared by the UNDP Country Office and the UNDP Regional Technical Advisor, and will be approved by the Programme Board. 219. A Programme Implementation Report (PIR) will be prepared for each year of project implementation. The Programme Manager, the UNDP Country Office and the UNDP Regional Technical Advisor will provide objective input into the annual PIR. The Programme Manager will ensure that the indicators included in the programme results framework are monitored annually well in advance of the PIR submission deadline and will objectively report progress in the Development Objective tab of the PIR. The annual PIR will be shared with the Programme Board and other stakeholders. The UNDP Country Office will coordinate the input of the NDA and other stakeholders to the PIR. The quality rating of the previous year’s PIR will be used to inform the preparation of the next PIR. The final PIR, along with the terminal evaluation report and corresponding management response, will serve as the final programme report package. 220. Two Programme Progress Reviews (PPRs) will be undertaken, notably early in year 3 and in mid-year 5, and the findings and responses outlined in the management response will be incorporated as recommendations for enhanced implementation during the programme’s duration. The terms of reference, the review process and the final PPR reports will follow the standard templates and guidance available from the UNDP Independent Evaluation Office (IEO). The PPR reports will be cleared by the UNDP Country Office and the UNDP Regional Technical Advisor, and will be approved by the Programme Board. The Programme Progress Review reports will be publicly available in the English language, on the IEO website.221. Two independent terminal evaluations (TEs) will take place no later than three months prior to the operational closure of each of the two phases (Phase 1 and Phase 2) of the programme. The terms of reference, the review process and the final TE reports will follow the standard templates and guidance available from the UNDP Evaluation Resource Centre. The final TE reports will be cleared by the UNDP Country Office and the UNDP Regional Technical Advisor, and will be approved by the Programme Board. The TE reports will be available in English. The UNDP Country Office will include the planned programme terminal evaluations in the UNDP Country Office evaluation plan, and will upload the final terminal evaluation reports and the management responses in English to the public UNDP Evaluation Resource Centre (ERC) ([www.erc.undp.org](http://www.erc.undp.org)). 222. The UNDP Country Office will retain all M&E records for this programme for up to seven years after programme financial closure in order to support ex-post evaluations.223. A detailed M&E budget, monitoring plan and evaluation plan will be included in the UNDP programme documents.  |

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| I. Supporting Documents for Funding Proposal |
| [x]  NDA No-objection Letter (Annex I)[x]  Feasibility Study (Annex II)[x]  Integrated Financial Model that provides sensitivity analysis of critical elements (xls format) (Annex III)[x]  Confirmation letter or letter of commitment for co-financing commitment (Annex IV)[x]  Term Sheet (Annex V)[x]  Environmental and Social Impact Assessment (ESIA) (Annex VI)[x]  Appraisal Report or Due Diligence Report with recommendations (Annex VII)[x]  Evaluation Report of the baseline project (Annex VIII)[x]  Map indicating the location of the project/programme (Annex IX)[x]  Timetable of project/programme implementation (Annex X)[x]  Project/programme confirmation (see the template in Annex I to the Accreditation Master Agreement) (Annex XI)[x]  Economic analysis (Annex XII)[x]  Additional background details (Annex XIII) |

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

1. The budget total includes project management costs of the Executing Entity and oversight costs of the GCF Accredited Entity (which are based on the fee arrangement indicated in Section B.3). [↑](#footnote-ref-1)
2. The UN exchange rate in July 2015 is US$ 1 = MUR 35.23. [↑](#footnote-ref-2)
3. <https://cdm.unfccc.int/methodologies/standard_base/Grid_emission_Mauritius.pdf> [↑](#footnote-ref-3)
4. <http://statsmauritius.govmu.org/English/StatsbySubj/Documents/ei1179/water.pdf> [↑](#footnote-ref-4)
5. In 2014, fuel and related products accounted for 19% of total imports: <http://statsmauritius.govmu.org/English/StatsbySubj/Pages/Export-and-Import-1st-Quarter-2015.aspx> [↑](#footnote-ref-5)
6. <http://mauritiusassembly.govmu.org/English/hansard/Documents/2015/hansard0615.pdf> [↑](#footnote-ref-6)
7. <http://unfccc.int/resource/docs/natc/musnc2.pdf> [↑](#footnote-ref-7)
8. <http://unfccc.int/ttclear/templates/render_cms_page?TNR_cre> [↑](#footnote-ref-8)
9. <https://sustainabledevelopment.un.org/content/documents/1245mauritiusEnergy%20Strategy.pdf> [↑](#footnote-ref-9)
10. <http://www.investmauritius.com/budget2015/SREnergy.aspx> [↑](#footnote-ref-10)
11. <http://leboncoin.nu/2015/05/a-mauritius-renewable-energy-agency-to-be-set-up/> [↑](#footnote-ref-11)
12. <http://pmo.govmu.org/English/Documents/Reports%202015/Govt%20prog%202015.pdf> [↑](#footnote-ref-12)
13. <http://ceb.intnet.mu/grid_code/project.asp>. See also Annex IIb. [↑](#footnote-ref-13)
14. <http://mof.govmu.org/English/Pages/Budget20152016.aspx> [↑](#footnote-ref-14)
15. <http://pmo.govmu.org/English/Documents/Reports%202015/Govt%20prog%202015.pdf>, paragraph 288. [↑](#footnote-ref-15)
16. <http://mid.govmu.org/portal/sites/mid/index.html> [↑](#footnote-ref-16)
17. <http://the-tech.mit.edu/~richmond/publications/mauritiusbriefing.pdf> [↑](#footnote-ref-17)
18. See, for example, <http://www.mauritius-official.com/2011/10/public-transport-system-and-quality-of.html> [↑](#footnote-ref-18)
19. <http://nta.govmu.org/English//DOCUMENTS/ELIGIBILITY%20OF%20SUBSIDY%20ON%20THE%20PURCHASE%20OF%20NEW%20SEMI-LOW%20FLOOR%20BUSES%20UNDER%20THE%20BUS%20REPLACEMENT%20MECHANISM.PDF> [↑](#footnote-ref-19)
20. A semi low-floor bus has a maximum of two steps at the entrance and exit, with a low floor between the front and rear doors to permit easy access – in particular for old and disabled passengers. [↑](#footnote-ref-20)
21. Even with the Bus Modernisation Programme grants and rebates in place, and taking the most efficient, best-managed bus company in Mauritius (Rose Hill Transport, RHT), the payback time of switching to a diesel semi low-floor bus is 6 years. [↑](#footnote-ref-21)
22. <http://metservice.intnet.mu/climate-services/climate-change.php> [↑](#footnote-ref-22)
23. Mauritius Meteorological Services (2010) *Annual Report*, <http://www.metservice.intnet.mu/climate-services/climate-change.php> [↑](#footnote-ref-23)
24. <http://publicutilities.govmu.org/English/Pages/default.aspx> [↑](#footnote-ref-24)
25. <http://ceb.intnet.mu/> [↑](#footnote-ref-25)
26. <http://ceb.intnet.mu/CorporateInfo/IEP2013/Executive%20Summary.pdf> [↑](#footnote-ref-26)
27. <https://www.thegef.org/gef/project_detail?projID=2241> [↑](#footnote-ref-27)
28. <http://eemo.govmu.org/English/Pages/default.aspx> [↑](#footnote-ref-28)
29. <http://www.afd.fr/home/pays/afrique/geo-afr/maurice> [↑](#footnote-ref-29)
30. AF Mercados (2014), *Determination of the Grid Absorption Capacity of Mauritius and Preparation of a Grid Code, Feed-in Tariffs and Model Energy Supply Purchase Agreements for Renewable Energy Systems up to 2 MW,* September 2014. See Annex IIa. [↑](#footnote-ref-30)
31. <http://ceb.intnet.mu/CorporateInfo/ar2011.pdf> [↑](#footnote-ref-31)
32. <http://ceb.intnet.mu/CorporateInfo/IEP2013/Executive%20Summary.pdf> [↑](#footnote-ref-32)
33. CEB (2013), *Integrated Electricity Plan 2013-22*, page 115: <http://ceb.intnet.mu/CorporateInfo/IEP2013/Chapter4_Demand%20Forecast%20for%20Mauritius.pdf> [↑](#footnote-ref-33)
34. *Ibid*. [↑](#footnote-ref-34)
35. <http://www.tradingeconomics.com/mauritius/wages> [↑](#footnote-ref-35)
36. <http://localgovernment.govmu.org/English/Pages/outer%20Island/stbrandon.aspx> [↑](#footnote-ref-36)
37. <http://statsmauritius.govmu.org/English/StatsbySubj/Documents/ei1179/water.pdf> [↑](#footnote-ref-37)
38. [www.investmauritius.com/media/62792/budgetspeech2014.pdf](http://www.investmauritius.com/media/62792/budgetspeech2014.pdf) [↑](#footnote-ref-38)
39. The Euro 2 standard regulates vehicle emissions of nitrogen oxides (NOx), non-methane hydrocarbons (NMHC) / Volatile Organic Compounds (VOCs), carbon monoxide (CO) and particulate matter (PM). It does not regulate CO2 emissions. See <http://www.policymeasures.com/measures/detail/euro-standards/> [↑](#footnote-ref-39)
40. Office of the Road Transport Commissioner, National Transport Authority, Cassis, Mauritius. [↑](#footnote-ref-40)
41. <http://www.dieselforum.org/index.cfm?objectid=DB780C26-A34A-11E0-B3DD000C296BA163> [↑](#footnote-ref-41)
42. <http://www.nytimes.com/2009/10/22/automobiles/autospecial2/22BUS.html?_r=0>; <http://www.clean-fleets.eu/fileadmin/files/Clean_Buses_-_Experiences_with_Fuel_and_Technology_Options_2.1.pdf> [↑](#footnote-ref-42)
43. <http://www.eesi.org/files/eesi_hybrid_bus_032007.pdf> [↑](#footnote-ref-43)
44. <http://ec.europa.eu/environment/air/transport/road.htm> [↑](#footnote-ref-44)
45. In the case of intermittent renewables, it is the stability of power system frequency that is of principal concern. [↑](#footnote-ref-45)
46. The grid will be enabled to handle 185 MW of intermittent renewable energy in total. 60 MW of such capacity is already on the grid and the SSDG Phase 3 scheme will, with GCF support, result in a further 25 MW of installations – leaving 100 MW of additional RE capacity to be provided by CEB and IPPs. [↑](#footnote-ref-46)
47. <http://ceb.intnet.mu/tenders/TenderList.asp> [↑](#footnote-ref-47)
48. Participation of women and female-headed households as well as charitable institutions will be encouraged in the calls for proposals. [↑](#footnote-ref-48)
49. SSDG Phase 3 adopters – small-scale IPPs – will receive a payment from CEB for solar electricity supplied to the grid. This payment will be termed a ‘feed-in tariff’ but will be paid at a rate equal to CEB’s marginal cost of electricity generation (MUR 3.50/kWh), not at the premium rate offered under Phases 1 and 2. [↑](#footnote-ref-49)
50. Solar Energy Corporation of India (SECI) is the Government of India nodal agency for policy implementation and allocation of grid-connected solar power generation capacity to private project developers: <http://seci.gov.in/content/> [↑](#footnote-ref-50)
51. A 150 kW hybrid mini-grid in Vingt Cinq and 75 kW hybrid grids in La Fourche and Sainte Rita. [↑](#footnote-ref-51)
52. See, for example, SEI (2008), *Hybrid Electric and Battery Electric Vehicles: Measures to Stimulate Uptake*, <http://www.seai.ie/News_Events/Press_Releases/Measures_to_Stimulate_uptake.pdf> [↑](#footnote-ref-52)
53. <http://www.lexpress.mu/article/finances-dans-le-rouge-la-cnt-nest-pas-la-seule-compagnie-de-bus-en-difficulte> [↑](#footnote-ref-53)
54. Exclusive of project management costs and agency fees. [↑](#footnote-ref-54)
55. <http://www.unep.org/Transport/PCFV/PDF/mauritius2013_ImpactofRoadTraffic.pdf> [↑](#footnote-ref-55)
56. <http://publicinfrastructure.govmu.org/English/Publication/Documents/summary.pdf> [↑](#footnote-ref-56)
57. <http://www.defimedia.info/defi-quotidien/dq-xplik-cas/item/32230-le-transport-public-pointe-du-doigt-la-nta-met-en-garde-les-operateurs.html> [↑](#footnote-ref-57)
58. [http://www.govmu.org/English/News/Pages/The-Public-Transport-System-needs-to-be-modernised,-says-Mr-Bodha.aspx](http://www.govmu.org/English/News/Pages/The-Public-Transport-System-needs-to-be-modernised%2C-says-Mr-Bodha.aspx) [↑](#footnote-ref-58)
59. Route No. 4: Q Bornes (La Louise) – Vacoas - Curepipe; Route No. 1: Rose Hill – Port Louis; Route No. 19: Long Mountain – Port Louis. [↑](#footnote-ref-59)
60. International studies have shown that poor driving and inadequate maintenance of buses can increase fuel consumption by an average of around 10-15%. Asian Development Bank GEF-financed project, ‘China: ASTUD PRC Clean Bus Leasing’: <https://www.thegef.org/gef/project_detail?projID=5627> [↑](#footnote-ref-60)
61. <http://mof.govmu.org/English/Pages/default.aspx> [↑](#footnote-ref-61)
62. <http://publicutilities.govmu.org/English/Pages/default.aspx> [↑](#footnote-ref-62)
63. <https://www.thegef.org/gef/project_detail?projID=2241> [↑](#footnote-ref-63)
64. <http://sidsdock.org/financal-resources> [↑](#footnote-ref-64)
65. <http://ceb.intnet.mu/> [↑](#footnote-ref-65)
66. [http://attorneygeneral.govmu.org/English/Documents/A-Z%20Acts/C/Page%201/CENTRAL%20ELECTRICITY%20BOARD%20ACT,%20No%2032%20of%201963.pdf](http://attorneygeneral.govmu.org/English/Documents/A-Z%20Acts/C/Page%201/CENTRAL%20ELECTRICITY%20BOARD%20ACT%2C%20No%2032%20of%201963.pdf) [↑](#footnote-ref-66)
67. <https://www.thegef.org/gef/project_detail?projID=4099> [↑](#footnote-ref-67)
68. <http://attorneygeneral.govmu.org/English/Documents/A-Z%20Acts/O/OUTERISLANDSDEVELOPMENT1.pdf> [↑](#footnote-ref-68)
69. <http://publicinfrastructure.govmu.org/English/Pages/default.aspx> [↑](#footnote-ref-69)
70. <http://nta.govmu.org/English/Pages/default.aspx> [↑](#footnote-ref-70)
71. <http://ceb.intnet.mu/tariffs/Overview.asp> [↑](#footnote-ref-71)
72. <http://nta.govmu.org/English/Documents/Bus-12Aug13.pdf> [↑](#footnote-ref-72)
73. [http://attorneygeneral.govmu.org/English/Documents/A-Z%20Acts/E/Page%201/ENVIRONMENT%20PROTECTION%20ACT,%20No%2019%20of%202002.pdf](http://attorneygeneral.govmu.org/English/Documents/A-Z%20Acts/E/Page%201/ENVIRONMENT%20PROTECTION%20ACT%2C%20No%2019%20of%202002.pdf) [↑](#footnote-ref-73)
74. <http://environment.govmu.org/English/legislations/Pages/Environmental-Regulations.aspx> [↑](#footnote-ref-74)
75. <http://labour.govmu.org/English/Legislations/Pages/OSHA-2005-and-Regulations.aspx> [↑](#footnote-ref-75)
76. <http://labour.govmu.org/English/Legislations/Pages/Labour-Act.aspx> [↑](#footnote-ref-76)
77. <http://labour.govmu.org/English/Legislations/Pages/Employment-Rights-Act-2008-and-Regulations.aspx> [↑](#footnote-ref-77)
78. <http://eoc.govmu.org/English/Know%20Your%20Rights/Pages/Scope-of-the-Law.aspx> [↑](#footnote-ref-78)
79. Details are available on the Mauritius Revenue Authority website: <http://www.mra.mu/> [↑](#footnote-ref-79)
80. Useful information on taxes and FX in Mauritius can be found in World Bank (2014), *Doing Business 2015 – Going Beyond Efficiency: Mauritius Economy Profile*, <http://www.doingbusiness.org/reports/global-reports/doing-business-2015> [↑](#footnote-ref-80)
81. This figure includes project management costs but excludes agency fees. [↑](#footnote-ref-81)
82. Annual average of direct and indirect emission reductions. [↑](#footnote-ref-82)
83. Direct and indirect emission reductions over the lifetimes of the investments enabled by the programme. [↑](#footnote-ref-83)
84. GEF guidance is to use a default replication factor of 3 for investment projects that incorporate capacity building. Here, a conservative value of 1.5 is proposed. [↑](#footnote-ref-84)
85. *Road Transport and Road Traffic Accident Statistics,* January-June 2014: <http://statsmauritius.govmu.org/English/StatsbySubj/Documents/ei1130/road.pdf> [↑](#footnote-ref-85)
86. <http://www.defimedia.info/defi-quotidien/dq-actualites/item/50628-transport-public-les-nouveaux-defis-qui-guettent-les-operateurs-individuels.html> [↑](#footnote-ref-86)
87. <http://www.defimedia.info/defi-quotidien/dq-xplik-cas/item/32230-le-transport-public-pointe-du-doigt-la-nta-met-en-garde-les-operateurs.html> [↑](#footnote-ref-87)
88. ILO (2014), *Green Jobs Assessment: Mauritius*, <http://www.ilo.org/global/topics/green-jobs/publications/WCMS_317238/lang--en/index.htm> [↑](#footnote-ref-88)
89. <http://statsmauritius.govmu.org/English/StatsbySubj/Pages/External-Trade.aspx> [↑](#footnote-ref-89)
90. Reported in the National Budget 2015. [↑](#footnote-ref-90)
91. <http://mof.govmu.org/English/Legislation/Documents/PubDebtManagementAct.pdf> [↑](#footnote-ref-91)
92. <http://www.investmauritius.com/budget2015/Economic.aspx> [↑](#footnote-ref-92)
93. <http://statsmauritius.govmu.org/English/StatsbySubj/Pages/NAE-June-2015.aspx> [↑](#footnote-ref-93)
94. <http://unfccc.int/resource/docs/natc/musnc2.pdf> [↑](#footnote-ref-94)
95. <http://unfccc.int/ttclear/templates/render_cms_page?TNR_cre> [↑](#footnote-ref-95)
96. <http://pmo.govmu.org/English/Documents/Cabinet%20Decisions%202013/Cabdec16August2013.pdf> [↑](#footnote-ref-96)
97. <https://sustainabledevelopment.un.org/content/documents/1245mauritiusEnergy%20Strategy.pdf> [↑](#footnote-ref-97)
98. <http://pmo.govmu.org/English/Documents/Reports%202015/Govt%20prog%202015.pdf> [↑](#footnote-ref-98)
99. <http://business.mega.mu/2011/04/19/cabinet-approved-maurice-ile-durable-mid-project/> [↑](#footnote-ref-99)
100. <http://mid.govmu.org/portal/sites/mid/index.html> [↑](#footnote-ref-100)
101. <http://gender.govmu.org/English/Documents/activities/nat_gen_pol_fr_mts.doc> [↑](#footnote-ref-101)
102. <https://www.thegef.org/gef/project_detail?projID=4099> [↑](#footnote-ref-102)
103. <https://www.thegef.org/gef/project_detail?projID=2241> [↑](#footnote-ref-103)
104. <http://sidsdock.org/financal-resources> [↑](#footnote-ref-104)
105. UNDP-UNEP CDM Capacity Development Project (2008-2013), <http://www.undp.org/content/undp/en/home/ourwork/environmentandenergy/strategic_themes/climate_change/carbon_finance/CDM/mauritius_opportunities.html> [↑](#footnote-ref-105)
106. See, for example, Community Power Agency (2014), *Government Support Options for Community Energy: Best Practice International Policy*: <http://cpagency.org.au/wp-content/uploads/2015/01/CPA_Best-Practice-International-Policy_Oct-2014.pdf> [↑](#footnote-ref-106)
107. Mid-range estimate is US$ 25: <http://www.epa.gov/climatechange/EPAactivities/economics/scc.html> [↑](#footnote-ref-107)
108. Figures are inclusive of project management costs and agency fees. [↑](#footnote-ref-108)
109. Public sector includes co-finance from Government, CEB, UNDP and AFD. Private sector includes co-finance from households and other private IPPs, and bus companies. [↑](#footnote-ref-109)
110. Leveraged finance is defined here as being investment that is enabled by the GCF programme and is catalysed by the programme, but which is not under the direct influence of the programme. [↑](#footnote-ref-110)
111. IRENA (2014), *Socio-Economic Benefits of Solar and Wind Energy*: <http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=418> [↑](#footnote-ref-111)
112. As per the Ministry of Finance and Economic Development’s guidelines for physical assets, there is no need to consider a SERF. However, in reality, a SERF is not exactly the same as the official exchange rate. Hence, a small deviation is considered. [↑](#footnote-ref-112)
113. World Bank (2008), *The Welfare Impact of Rural Electrification: A Reassessment of the Costs and Benefits – An IEG Impact Evaluation*, <http://documents.worldbank.org/curated/en/2008/05/9850725/welfare-impact-rural-electrification-reassessment-costs-benefits-ieg-impact-evaluation> [↑](#footnote-ref-113)
114. The project is only expected to be installed by 2019; however, since the CBA is being conducted now, constant 2015 prices are considered. [↑](#footnote-ref-114)
115. UITP (2009), *Interaction of Buses and Signals at Road Crossings*, <http://trid.trb.org/view.aspx?id=907320> [↑](#footnote-ref-115)
116. <http://www.indian-ocean-times.com/Maurice-11-eoliennes-construites-dans-le-Nord-de-l-ile-par-le-groupe-francais-Quadran_a5134.html> [↑](#footnote-ref-116)
117. <http://www.lexpress.mu/article/environnement-la-construction-du-parc-%C3%A9olien-de-plaine-sophie-contest%C3%A9e> [↑](#footnote-ref-117)
118. See Annex IIa. [↑](#footnote-ref-118)
119. <http://www.clean-fleets.eu/fileadmin/files/Clean_Buses_-_Experiences_with_Fuel_and_Technology_Options_2.1.pdf> [↑](#footnote-ref-119)
120. *Ibid.* [↑](#footnote-ref-120)
121. <http://environment.govmu.org/English/eia/Pages/Environmental-Impact-Assessment.aspx> [↑](#footnote-ref-121)
122. <http://www.undp.org/content/dam/undp/library/corporate/Social-and-Environmental-Policies-and-Procedures/UNDPs-Social-and-Environmental-Standards-ENGLISH.pdf> [↑](#footnote-ref-122)
123. <http://eoc.govmu.org/English/Know%20Your%20Rights/Pages/Scope-of-the-Law.aspx> [↑](#footnote-ref-123)
124. <http://localgovernment.govmu.org/English/Legislations/Pages/Local-Government-Act.aspx> [↑](#footnote-ref-124)
125. Information on the Fund’s expected results and indicators can be found in its Performance Measurement Frameworks available at the following link (Please note that some indicators are under refinement): <http://www.gcfund.org/fileadmin/00_customer/documents/Operations/5.3_Initial_PMF.pdf> [↑](#footnote-ref-125)