



Verified Carbon Standard

AMBATOLAMPY 20 MW SOLAR PV



Document Prepared by AERA Group
On behalf of GreenYellow Madagascar

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CONTENTS

1	PROJECT DETAILS.....	3
1.1	Summary Description of the Implementation Status of the Project	3
1.2	Sectoral Scope and Project Type	3
1.3	Project Proponent.	3
1.4	Other Entities Involved in the Project	4
1.5	Project Start Date	4
1.6	Project Crediting Period	4
1.7	Project Location	4
1.8	Title and Reference of Methodology	6
1.9	Participation under other GHG Programs	6
1.10	Other Forms of Credit.....	6
1.11	Sustainable Development Contributions	6
2	SAFEGUARDS	7
2.1	No Net Harm	7
2.2	Local Stakeholder Consultation	9
2.3	AFOLU-Specific Safeguards	11
3	IMPLEMENTATION STATUS	ERREUR ! SIGNET NON DEFINI.
3.1	Implementation Status of the Project Activity	11
3.2	Deviations	12
3.3	Grouped Projects	12
4	DATA AND PARAMETERS.....	13
4.1	Data and Parameters Available at Validation	12
4.2	Data and Parameters Monitored.....	14
4.3	Monitoring Plan.....	16
5	QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS	17
5.1	Baseline Emissions	17
5.2	Project Emissions	18
5.3	Leakage.....	18
5.4	Net GHG Emission Reductions and Removals.....	18

1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Ambatolampy 20 MW solar PV (“the project”) consists of the construction and operation of a greenfield 20 MW solar photovoltaic power plant by GreenYellow Madagascar (“GreenYellow”) in Ambatolampy, in the South-East of Vakinankaratra region, Madagascar. It involves the setting up of photovoltaic (PV) panels which captures solar energy and convey such energy to the convertor station in order to produce electricity exported to the national grid.

Electricity in Madagascar is currently heavily reliant on imported fossil fuels currently consumed by thermal power stations (514 MW) versus hydropower plants (162 MW)¹, thus a baseline scenario also considered as the scenario prior to the implementation of the project activity leading to considerable greenhouse gas (GHG) emissions. The project activity undertaken by project promoter GreenYellow therefore substitutes grid electricity by clean and renewable energy, and cut down GHG emissions.

The project is the first large-scale solar PV power plant on the island and is expected to generate approximately 23,431 tCO_{2e} emission reductions per year and 164,018 tCO_{2e} of emission reductions over the 7 years crediting period. During this monitoring period, the project generated 31,766 tCO_{2e} emission reductions.

The building permit signature of the project is 15/12/2017, which is also the construction start date. The commissioning date is 10/07/2018 and since then, the project has operated consinuously. Similarly and during the monitoring period 01-May-2020 to 31-Dec-2021, the project has operated continuously and satisfactorily. The only noteworthy event involved the replacement of faulty inverter which led to under-performance in November-December 2021.

1.2 Sectoral Scope and Project Type

The sectoral scope is Scope 1 – Energy Industries (renewable sources) – ACM0002: Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources, Version 19.0. The project is a renewable energy type and is not a grouped project.

1.3 Project Proponent.

Organization name	GreenYellow Madagascar
Contact person	Kevan RAFFI KHANSARI
Title	Project Management Officer

¹ <https://www.africa-eu-renewables.org/market-information/madagascar/energy-sector/>

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1.4 Other Entities Involved in the Project

Organization name	AERA Group
Role in the Project	Carbon consultant
Contact person	Alexandre Dunod
Title	Chief Operating Officer
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1.5 Project Start Date

10-July-2018, as the date of commissioning, synchronization and start of GHG emission reductions.

1.6 Project Crediting Period

The project crediting period started on 10-July-2018 and lasts 7 years, until 9-July-2025. The project crediting period is renewable twice.

1.7 Project Location

Host Party: Madagascar

Region/State/Province: Region of Vakinankaratra, District of Ambatolampy

City/Town/Community: The site is located in Ambatolampy, 90km South of Antananarivo, Madagascar.

The project surface is 28 hectares and its geo-coordinates are: Latitude: 19° 29'22"S; Longitude: 47° 26'42"E.

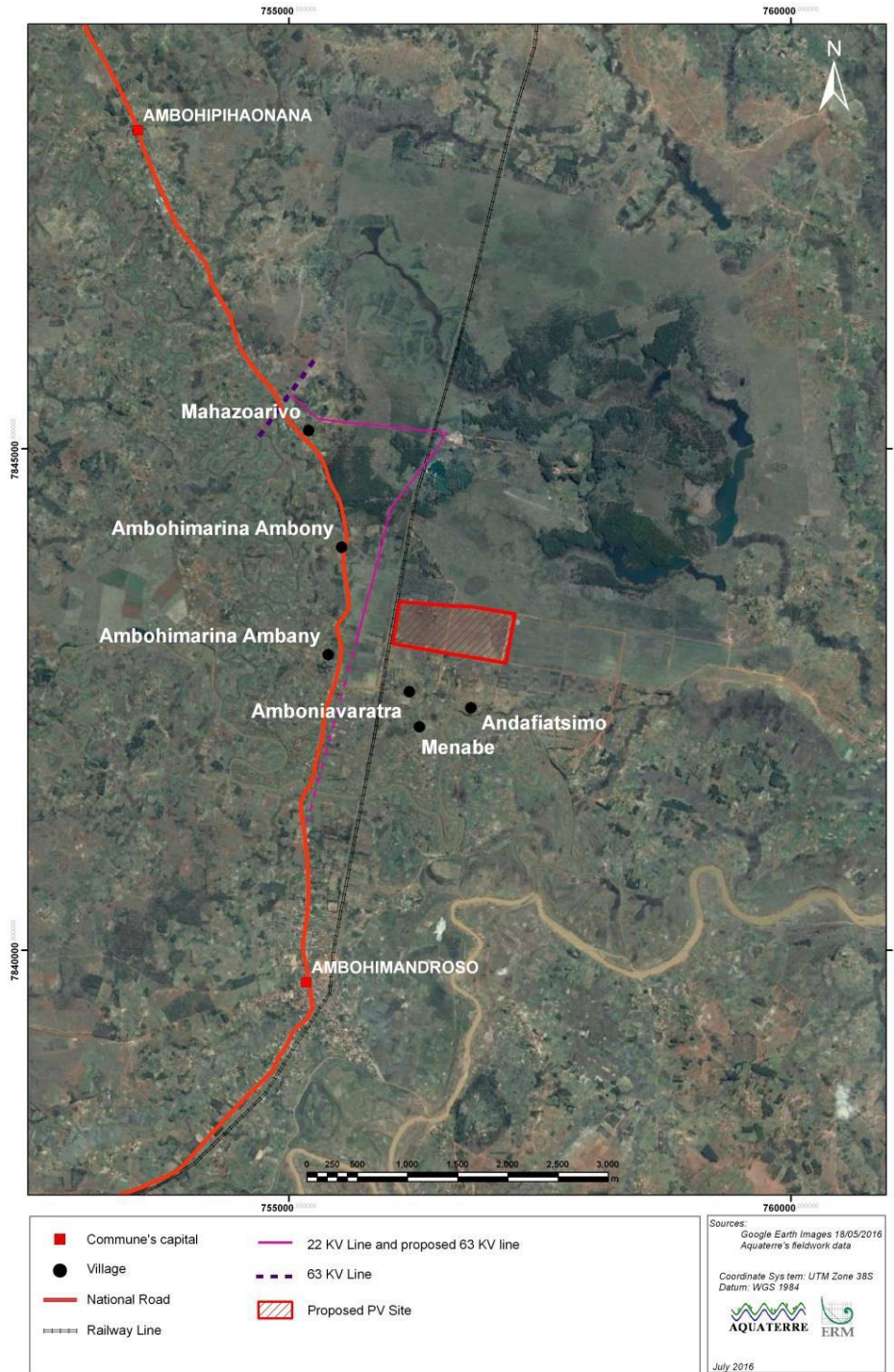


Figure 1: Location of project site

1.8 Title and Reference of Methodology

The methodology is ACM0002: Large-scale Consolidated Methodology: “Grid-connected electricity generation from renewable sources”, Version 19.0².

1.9 Participation under other GHG Programs

The project is registered under the Clean Development Mechanism³ (Project #10481) on 03-May-2019, although its GHG emission reduction will either be claimed under the VCS programme or the CDM programme, never both.

1.10 Other Forms of Credit

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

The project has neither sought nor received another form of GHG-related environmental credits.

1.11 Sustainable Development Contributions

The project participants are confident that the proposed project activity will make significant impact on Madagascar sustainable development, as also confirmed by the host country in its Letter of Approval of January 19th 2021.

Greenhouse Gas emissions reduction

The project will generate electricity from a renewable and clean energy source, thus avoiding the dispatch of the same amount of electricity produced by fossil-fueled power plants to Madagascar grid. Besides, the SO_x emissions from coal-fired power plants would also be reduced.

Development of renewable energy

The project will form a major part of the country’s approach to sustainable development also in helping to diversify energy supply away from non-renewable sources, in line with the objectives of the Madagascar Action Plan⁴ launched in 2006 (see development of the infrastructure and the rural areas, protection of the environment), complemented by the New Energy Policy 2015-2030 vision. The project will improve energy self-sufficiency of the country, alleviating the associated risks of price variations.

Employment opportunities

² <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQCOPWPGWWDN8ED5PG>

³ <https://cdm.unfccc.int/Projects/DB/RWTUV1556909746.23/view>

⁴ https://www.imf.org/~media/Websites/IMF/imported-publications/external/pubs/ft/scr/2007/fra/_cr0759f.ashx

The project contributes to the local employment throughout its building and operation phases, its workforce consisting of up to 80 workers at the peak of construction phase and approximately 10 workers in the operations phase. It will also induce indirect employment by increasing the competitiveness of local industry from reducing the country's dependency on fossil fuels.

Therefore, Madagascar Government is supportive of the project because the development of solar PV power is in accordance with the national criteria for sustainable development and national policies relating to energy resources and the environment, which will push forward the use of renewable and clean energy across the country – where less than one person out of five currently has access to electricity.

Technology transfer

This type of renewable energy project will assist building capacities in the country, through advanced technology transfer from industrialized countries. The project will introduce solar PV technology, methods and skills in the island and demonstrate its applicability and efficiency, thus widening its accessibility. The technology is manufactured by Jinko Solar. The technology for large scale solar PV power generation is still at starting stage of consideration in the country, Ambatolampy 20 MW project being the first large-scale solar PV realization in Madagascar.

Projects registered before 20 January 2023 shall demonstrate contributions to at least three SDGs by 20 January 2025⁵.

2 SAFEGUARDS

2.1 No Net Harm

As per the amended Environmental Protection Act (EPA, 2008), an Environment Impact Assessment (EIA) is required for “Power Generating Plants”. This assessment was carried out by ERM in partnership with Aquaterre based on a desktop review of available documentation on the Project, as well as a site survey undertaken by the Consultant in July 2016. The standards used for this assessment are the International Finance Corporation's (IFC) Performance Standards (2012). The objective of this assessment was to identify the key environmental and social sensitivities in the Project area, key potential impacts associated with the Project, and how to manage those in the next stages of Project planning and implementation.

The following environmental and social aspects were identified and expected to be of negligible to minor significance:

- Geology and Soils: limited soil disturbance activities during construction and decommissioning activities, soil contamination risk is very limited and the site sensitivity is low.

⁵ As per VCS Standard, version 4.2, Appendix 2 Document History ; version 4.2, 4

- Hydrology and hydrogeology: surfacing on site will be limited to a very small area and is not expected to change drainage pattern; project groundwater abstraction will be limited during the 10 months of construction activities.
- Noise: limited transient sources of day-time construction noise (heavy vehicles, earthworks and piling; no significant source of noise during operations.
- Air quality: the only source of atmospheric emissions is exhaust gas from vehicles and generators. Dust arising in the construction phase will be mitigated through water spraying and general construction good practice.
- Biodiversity: no specific biodiversity sensitivity in the Project area and well delineated Project with a limited footprint.
- Waste: the project will generate significant quantities of waste during construction and decommissioning phase however these will be easily managed through industrial best practice and the waste management plan specific to the Project.
- Landscape and visual: the change to landscape will be limited and not noticeable from nearby receptors.
- Traffic and transport: the traffic generated by the project will be limited in time and intensity during construction and decommissioning phase.

Impact on community health and safety: The project construction and decommissioning activities will generate a significant amount of traffic on the already busy Project area road network. The project will deliver equipment and materials to the Project site using RN7 which has a very poor safety records. The Project will manage road traffic associated with the Project by grouping deliveries to the site to limit the impact in time. Additional measures will be implemented to further prevent the risk of road traffic accidents involving local communities including the development of a road traffic management plan, the strict implementation of speed limits and the provision of advanced training to Project's drivers.

Impact on land use: The development of the Project will lead to a change to communities land use of the PV power plant site. Access to the site will no longer be possible for local communities when construction activities start. However, a significant amount of greenfield land of similar characteristics is available in the immediate vicinity of the PV power plant site and the restriction to land use will lead to minor disturbance. The Project will ensure in coordination with Malagasy authorities that that an appropriate area of nearby pastures adjacent to the PV power plant site is left available for communities. The Project will also arrange alternative access road outside of the Project site to maintain communities' access to natural resources north of the PV power plant site.

Impact on cultural heritage: In order to prevent any impact to the several tombs presents within or close to the proposed 63 kV OTL route, the Project will ensure appropriate communications with local stakeholders are undertaken prior to construction activities. Construction works will be conducted in a culturally appropriate way and a chance find procedure will be implemented during the construction phase.

Impact on occupational health and safety: As inappropriate management of occupational health and safety hazards could lead to unsafe working conditions and accidents, injuries or illnesses amongst workers, the Project will develop and implement specific Occupational Health and safety policies and

procedures specific to the project. The project will also provide personal protective equipment to workforce and ensure their consistent use throughout the construction and decommissioning phases.

2.2 Local Stakeholder Consultation

Stakeholder engagement has been undertaken as part of the site visit between the 5th and 8th of July 2016. The purpose of stakeholder engagement is to ensure Project's stakeholders are informed about the Project and that their views and opinions about the Project and its associated impacts are taken into consideration during the impact assessment process.

Key stakeholder groups identified:

Stakeholder category	Stakeholder designation	Simplified ESIA engagement status
Local authority	<ul style="list-style-type: none"> • Ambohipihoanana mayor and treasurer • Ambohimandroso mayor • Lovainjafy Fokontany president 	Engaged
Regional authority	<ul style="list-style-type: none"> • Vakinankaratra region officials 	Not engaged
National authority	<ul style="list-style-type: none"> • Office de Régulation de l'Electricité (Power Regulation Authority) • Energy ministry 	Not engaged during the site visit by ERM but engaged directly by GreenYellow
Local economical stakeholder	<ul style="list-style-type: none"> • Ambohimena brick factory owner 	Engaged
National economical stakeholder	<ul style="list-style-type: none"> • JIRAMA 	Not engaged during the site visit by ERM but engaged directly by GreenYellow
Local community	<ul style="list-style-type: none"> • Ambohimarina ambony community • Ambohimarina Ambany community • Amboniavaratra community • Mahazoarivo community 	Engaged
Medical staff	<ul style="list-style-type: none"> • Ambohipihoanana's doctor 	Engaged

Stakeholder meetings held between the 6th and 8th of July 2016 :

Stakeholder	Stakeholder category	Type of meeting	Date
Ambohipihoanana mayor and treasurer	Local authority	Face to face	5 th of July 2016
Ambohimandroso mayor	Local authority	Face to face	5 th of July 2016
Lovainjafy fokontany president	Local authority	Face to face	6 th of July 2016
Amboniavaratra community	Local community	Focus group	6 th of July 2016

Ambohimarina community	Ambany	Local community	Focus group	6 th of July 2016
Ambohimarina community	ambony	Local community	Focus group	7 th of July 2016
Mahazoarivo community		Local community	Focus group	7 th of July 2016
Ambohipihoanana doctor		Medical staff	Face to face	7 th of July 2016
Ambohimena brick factory owner		Local economical stakeholder	Face to face	7 th of July 2016

Stakeholders participation were invited directly by the local authority representative (Fokontany chief) through direct communication. The following information was disclosed:

- the broad technical characteristics of the Project including nature and high-level description of the various Project's components, to raise awareness on the Project's impacts and risks,
- a general indicative location within the 400ha footprint of the region's land; and
- an indicative duration of construction and operation phase.



Figure 2: Pictures of the stakeholder meetings

Category	Stakeholder comment
<i>Key concerns</i>	
Project impacts	Irrigation and drainage is an issue on the PV power plant site.
Project cost	Communities are concerned they may have to take part in the 63 kV OTL funding.
Project execution	Community representative is concerned the Project might be relocated elsewhere and that local communities would lose potential development and employment opportunities
Land availability	Community west of the Project is concerned about land availability and the potential impact of the Project on their land and crops.
<i>Key expectations</i>	
Economic development	<ul style="list-style-type: none"> • The Project will generate employment opportunities • The electricity generated by the Project will support development of local businesses in the area.
Access to electricity	The Project may give access to electricity to local communities

Comments were invited verbally during face to face meetings and focus groups as well as remotely. Considering the level of details disclosed to stakeholders during the simplified ESIA process and its early

stage nature, stakeholders' feedback on the Project was limited, but considered to be nonetheless representative of the key concerns and expectations associated with the Project.

Consideration of comments received:

The comments received were duly considered in the project's development and preparation of its Environmental and Social Action Plan (ESAP), which objective is to set out the key actions that need to be undertaken by the Project in order to achieve compliance with the applicable environmental and social standards, and in particular those from the IFC:

- IFC Performance Standards 1 - Assessment and Management of Environmental and Social Risks and Impacts
- IFC Performance Standard 2 - Labor and Working Conditions
- IFC Performance Standard 3 - Resource Efficiency and Pollution Prevention
- IFC Performance Standard 4 - Community Health, Safety, and Security
- IFC Performance Standard 5 - Land Acquisition and Involuntary Resettlement
- IFC Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources
- IFC Performance Standard 8- Cultural Heritage

GreenYellow retains an overarching responsibility to ensure that all the actions recommended in the ESAP are implemented even though it is not its directly responsible for their implementation. If the responsibility of an action lies with a GreenYellow contractor, GreenYellow will monitor the implementation of the action and will assess the efficiency and effectiveness of the action and require corrective actions where necessary.

During this monitoring period 01-May-2020 to 31-December-2021, no local stakeholder comments were received as per grievance register records attached to the 2021 Environmental & Social Monitoring Report, with comments only pertaining to the extension phase.

2.3 AFOLU-Specific Safeguards

Not applicable (this project is not an AFOLU project)

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The commission date of the project activity is 10-July-2018, which is also the start date of GHG emission reductions. During the monitoring period 01-May-2020 to 31-Dec-2021, the project has operated continuously and satisfactorily, generating a total net energy delivered to the grid equal to 47.5 GWh. The only noteworthy event involved the replacement of faulty inverter which led to under-performance in

November-December 2021. No changes on the project activity or applicable legislation have occurred during this second monitoring period.

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviations occurred during this monitoring period.

3.2.2 Project Description Deviations

No methodology deviations occurred during this monitoring period.

3.3 Grouped Projects

This is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,CM,y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”
Source of data	JIRAMA 2015-2017 data
Value applied	0.6703
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	EF _{grid,OM,y}
Data unit	tCO ₂ /MWh

Description	Operating Margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”
Source of data	JIRAMA 2015-2017 data
Value applied	0.668
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	EF _{grid, BM, y}
Data unit	tCO ₂ /MWh
Description	Build Margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”
Source of data	JIRAMA 2015-2017 data
Value applied	0.677
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	The percentage share of total installed capacity of solar PV
Data unit	%
Description	The percentage share of total installed capacity of the solar PV in the total installed grid connected power generation capacity in the host country.
Source of data	https://www.africa-eu-renewables.org/marketinformation/madagascar/energy-sector/
Value applied	0.1
Justification of choice of data or description of	-

measurement methods and procedures applied	
Purpose of Data	Additionality demonstration
Comments	-

Data / Parameter	The total installed capacity of solar PV
Data unit	MW
Description	The total installed capacity of the solar PV in the host country.
Source of data	
Value applied	0.53
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Additionality demonstration
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	EG _{facility,y}		
Data unit	MWh/yr		
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y		
Source of data	Measured directly with electricity meter(s) at JIRAMA sub-station		
Description of measurement methods and procedures to be applied	Electricity outputs are electronically recorded, stored and invoiced monthly to JIRAMA by GY Madagascar, based on main meter (or back-up in case of main meter unavailability or default).		
Frequency of monitoring/recording	Continuous measurement and at least monthly recording		
Value monitored	2020	2021	Total
	21,419	26,068	47,487
Monitoring equipment	The measurement devices of net electrical energy delivered to RI-Tana grid are both located before 20/63kV transformer at JIRAMA substation and feature the following specifications:		

	Meter designation:	Main	Back-up (since 02/08/2021)
	Meter ownership:	GreenYellow	JIRAMA
	Make:	Landis+Gyr	DTSD
	Model:	E650 ⁶	178M ⁷
	Accuracy class:	0.2S (±0.2%)	0.2S (±0.2%)
	Serial Number:	No. 3507387521272	No. 012000005221
	Calibration date:	n/a ⁸	02/08/2021
	Back-up (between 06/03/2021 and 02/08/2021)	Back-up (between 27/02/2021 and 06/03/2021)	Back-up (before 27/02/2021)
	JIRAMA	JIRAMA	JIRAMA
	Landis+Gyr	Sagem	Landis+Gyr Dialog
	ZMD245	CX3500 ⁹	ZMD405 ¹⁰
	0.2S (±0.2%)	0.2S (±0.2%)	0.2S (±0.2%)
	Serial number : 95766642	Serial number : 021074001552	Serial number : 95766898
	Calibration date : 06/03/2021	Calibration date : 27/02/2021	Calibration date : 12/07/2018
QA/QC procedures to be applied	Cross check of measurement results with records for sold electricity. As per PPA §9.3, meters' testing, inspection, repairs, re-calibration or replacement will be ensured by the Parties according to best practices. Yet as per manufacturer's manual, meters are calibrated at the factory and do not require any further calibration during their entire service life. Calibration by customer is, therefore, not necessary.		
Purpose of the data	Calculation of baseline emissions		

⁶ <https://www.landisgyr.eu/product/landisgyr-e650/>

⁷ https://www.dlms.com/product/DTSD178_208

⁸ "As per manufacturer's manual, meters are calibrated at the factory and do not require any further calibration during their entire service life." Ambatolampy 20MW solar PV, PDD section B.7.1

⁹ <https://www.sagemcom.hu/uploads/support/155/Datasheet-CX3500-02.pdf>

¹⁰ <https://www.mobipower.co.za/product/landisgyr-zmd405e650-ct-connected-demand-meter-high-accuracy/>

Calculation method	-
Comments	Since no information regarding the back-up meters calibration requirements was available, a conservative factor of 0.998 was applied to the net electricity generation value, corresponding to the accuracy class of the meters : 0.2S ($\pm 0.2\%$)

4.3 Monitoring Plan

The proposed project activity monitoring plan complies with the methodology ACM0002 - Grid-connected electricity generation from renewable sources, whereby it is stated that: As per ACM0002 provisions for record handling, all data collected as part of monitoring is archived electronically and kept at least for 2 years after the end of the last crediting period.

All measurements are conducted with calibrated measurement equipment according to relevant industry standards. Indeed, the quantity of net electricity generation supplied by the project plant to the grid is reliably monitored through calibrated electricity meters and cross-checked with sales records as part of quality assurance/quality control measures on top of CEB diligence.

Monitoring organization:

The Country Manager of GY Madagascar coordinates and endorses the overall responsibility for all CDM monitoring of the project, including:

- Develop, approve, execute, and improve the CDM Monitoring/Reporting Procedures;
- Organize in-house seminar to inform and train the company staff to the monitoring procedures;
- Ensure that instrumentations and devices are available and properly suited to efficiently perform the monitoring;
- Communicate and coordinate the monitoring work of all business units;
- Validate and electronically archive all monitoring data on a monthly basis throughout the crediting period (and conserve it at least for 2 further years);
- Calculate and report the emission reductions; and
- Coordinate the DOE work during the verification audit.

The Country Manager might appoint a CDM coordinator to delegate him the above specific tasks of monitoring supervision. The Technical/Engineering/Maintenance Department consisting of plant technicians will undertake the technical actions required by the monitoring plan, under the Country Manager's authority, to collect and record related data.

The Accounting/Sales Department (Chief Financial Officer) will crosscheck, reconcile or consolidate data with multiple sources whenever possible. At minimum, data obtained from the electricity meters is to be crosschecked with the electricity sales receipts. This kind of reconciliation activity will be recorded properly as DOE may request for such information during the verification.

Monitoring team training and emergency preparedness

Data collection, consolidation and results analysis is undertaken by a dedicated team adequately trained, well aware of CDM requirements. O&M workflow manual enforced on-site further includes all updated procedures in case of mistake/break-downs, emergency disconnections and cyclone warnings.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The monitoring period for which GHG emission reductions were achieved spans from 01/05/2020 to 31/12/2021. Baseline emissions are calculated according to the methodology as the product of (i) the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y ($EG_{\text{facility},y}$ = Exports – Imports, in MWh/yr) and (ii) the combined margin CO₂ emission factor for grid connected power generation in year y ($EF_{\text{grid,CM},y}$):

$$BE_y = EG_{PJ,y} \times EF_{\text{grid,CM},y}$$

Where:

BE_y	Baseline emissions in year y (t CO ₂ /yr)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)
$EF_{\text{grid,CM},y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO ₂ /MWh)

$EG_{PJ,y} = EG_{\text{facility},y}$ i.e. the quantity of net electricity generation supplied by the project plant to the grid, as monitored and displayed below on a monthly basis.

$EF_{\text{grid,CM},y} = 0.6703$ tCO₂/MWh, as the Project Proponent have calculated, the DOE validated and the CDM-EB registered.

Year	Exports	Imports	$EG_{\text{facility},y}$	$EF_{\text{grid,CM},y}$	BE_y
	kWh	kWh	MWh	tCO ₂ /MWh	t CO ₂
May-20	2,296,000	2,585	2,293	0.6703	1,537
June-20	1,840,600	2,576	1,838	0.6703	1,232
July-20	2,279,180	2,643	2,277	0.6703	1,526
Aug-20	3,048,490	2,693	3,046	0.6703	2,042
Sept-20	3,194,700	2,706	3,192	0.6703	2,140
Oct-20	3,093,280	2,607	3,091	0.6703	2,072
Nov-20	3,075,750	2,431	3,073	0.6703	2,060

Dec-20	2,611,940	2,547	2,609	0.6703	1,749
Jan-21	3,020,560	2,437	3,018	0.6703	2,023
Feb-21	2,339,689	2,295	2,337	0.6703	1,567
Mar-21	2,393,188	2,532	2,391	0.6703	1,602
Apr-21	2,162,470	2,549	2,160	0.6703	1,448
May-21	2,262,830	2,803	2,260	0.6703	1,515
June-21	2,152,920	3,369	2,150	0.6703	1,441
July-21	2,093,910	3,261	2,091	0.6703	1,401
Aug-21	2,493,220	2,897	2,490	0.6703	1,669
Sept-21	2,624,990	3,034	2,622	0.6703	1,757
Oct-21	2,333,770	4,085	2,330	0.6703	1,562
Nov-21	667,530	3,567	664	0.6703	445
Dec-21	1,558,230	2,546	1,556	0.6703	1,043
TOTAL	47,543,247	56,163	47,487		31,830

Note : A conservative deduction of meters error confidence interval was applied to the net electricity generation, during the Verification period by DOE. This brings the total electricity generated on the monitoring period to **47,392 MWh**, and the Emission Reductions to **31,766 tCO_{2e}**.

5.2 Project Emissions

No project emissions are expected as the project activity only involves renewable electricity generation from the solar power plant: $PE_y = 0$.

5.3 Leakage

As stated in the applicable methodology, no leakage emissions are considered.

5.4 Net GHG Emission Reductions and Removals

The monitoring period for which GHG emission reductions were achieved spans from 01/05/2020 to 31/12/2021, split by vintage as it follows:

Year	Baseline emissions or removals (tCO _{2e})	Project emissions or removals (tCO _{2e})	Leakage emissions (tCO _{2e})	Net GHG emission reductions or removals (tCO _{2e})
2020	14,328	-	-	14,328
2021	17,438	-	-	17,438
Total	31,766	-	-	31,766

Ex-ante calculations of Emission Reductions estimated : for the year 2020, the project was supposed to reduce 23,632 tCO_{2e}. For the year 2021, it was 23,513.

Thus for the monitoring period spanning from 01/05/2020 to 31/12/2021, the project was expected to reduce $8/12 * 23,632 + 23,513 = 39,268$ tCO_{2e}. Ex-post ER is equal to 31,830 tCO_{2e} which is 81% of the expected value. The difference can be explained by overall solar PV lower performance due to faulty inverter's replacement in Q4-2021, as well as unavailability of the grid.

Note : A conservative deduction of meters error confidence interval was applied to the net electricity generation, during the Verification period by DOE. This brings the total Emission Reductions to **31,766 tCO_{2e}** on the monitoring period : 14,328 in 2020 and 17,438 in 2021.