Sri Lanka® Carbon Crediting Scheme

Carbon Management Assessment (CMA)

TALAWAKELLE TEA ESTATES PLC

ROOFTOP SOLAR PV BUNDLE PROJECT

Talawakelle Tea Estates PLC
No. 400, Deans Road,
Colombo 10.

Project Title	*Talawakelle Tea Estates PLC Rooftop Solar PV Bundle Project*
Version	*Version 03*
Date of Issue	*11/12/2023*
Project proponent/s	*Talawakelle Tea Estates PLC*
Prepared By	*Talawakelle Tea Estates PLC*
Contact	*No 400, Deans Road, Colombo10, Sri Lanka* *Telephone: 011 262 7000* *Email: tpl.tea@ttel.hayleys.com* *Website: https://www.talawakelleteas.com*

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1. Description of Project Activity

1.1. Introduction of Project Activity

Summary Description of Technologies/Measures

The Rooftop Solar PV Bundle Project aims to implement a comprehensive solar photovoltaic (PV) system in Estates of Talawakelle Tea Estates PLC. The project involved the installation of high-quality solar panels, inverters, mounting structures, and balance of system components. The system will be designed to efficiently convert sunlight into electricity and feed it into the local power grid.

Location

The project was implemented in factory sites of Talawakelle Tea Estates PLC. The specific site selection was based on factors such as solar resource availability, land suitability, and proximity to the electricity grid infrastructure.

GHG Emission Reductions or Removals

The project's primary objective is to mitigate greenhouse gas (GHG) emissions by displacing conventional electricity generation with clean and renewable solar energy. By utilizing solar power, the project reduces the reliance on fossil fuel-based electricity generation, thereby decreasing emissions of carbon dioxide (CO_2) and other harmful pollutants associated with conventional power production.

Scenario Prior to Project Implementation

Prior to the implementation of a rooftop solar PV bundle project, the scenario typically involved electricity consumption primarily met through the grid. The grid electricity mix includes coal, natural gas, oil, hydroelectric power, or a combination of these. This resulted in the emission of greenhouse gases (GHGs) and associated environmental impacts. The reliability of electricity supply relied on the functioning of the grid, and energy costs were determined by prevailing rates, which could fluctuate and be expensive. The implementation of the rooftop solar PV bundle project aimed to introduce clean, renewable energy generation, reduce GHG emissions, enhance energy independence, improve grid stability, and potentially lower electricity costs.

Estimate of GHG Emission Reductions and Removals:

The annual average and total GHG emission reductions achieved by the Solar PV Bundle Project will depend on several factors, including the installed capacity of the PV system, solar resource availability, electricity demand, and the carbon intensity of the grid electricity it displaces.

1.2. Sectoral Scope and Project Type

The majority of the projects proposed within CDM Sri Lanka fall under small-scale methodologies, particularly Type 1 - Category 1.D, which focuses on renewable power generation for the grid. This project involves the implementation of rooftop solar photovoltaic systems to generate renewable energy. This is eligible for registration under the Sri Lanka Carbon Crediting Scheme (SLCCS) in accordance with the small-scale methodologies of CDM-AMS-I.D (Version 18.0) for grid-connected renewable energy generation.

1.3. Project Proponent

Organization Name	*Talawakelle Tea Estates PLC*
Contact Person	*Mr. Krishna Ranagala*
Address	*N0 400, Deans Road, Colombo 10*
Title	*Deputy General Manager - Sustainability & QSD*
Telephone	*011-2627754, 011-2697203*
Fax	---
E-mail	*Krishna.Chathuranga@ttel.hayleys.com*

1.4. Other Entities Involved in the Project

Organization Name	*Bearwell Estate*
Role in the project	*Contractor for supply, installation and commissioning of Solar PV system at Bearwell Estate.*
Contact Person	*Mr. E S B A Egodawela*
Address	*Bearwell Estate, Bearwell*
Title	*Senior Deputy General Manager*
Telephone	*0772919375*
Fax	*0112627782*
E-mail	*Bearwell@ttel.hayleys.com*

Organization Name	*Calsay Estate*
Role in the project	*Contractor for supply, installation and commissioning of Solar PV system at Calsay Estate.*
Contact Person	*Mr. A B Kodagoda*
Address	*Calsay Estate, Calsay*
Title	*Deputy Manager – In-charge*
Telephone	*0772435557*
Fax	*0112627782*
E-mail	*Calsay@ttel.hayleys.com*

Organization Name	*Deniyaya Estate*
Role in the project	*Contractor for supply, installation and commissioning of Solar PV system at Deniyaya Estate.*
Contact Person	*Mr. K M N Prasan*
Address	*Deniyaya Estate, Deniyaya.*
Title	*Manager*
Telephone	*0772919420*
Fax	*0112627782*
E-mail	*Deniyaya@ttel.hayleys.com*

Organization Name	*Dessford Estate*
Role in the project	*Contractor for supply, installation and commissioning of Solar PV system at Dessford Estate.*
Contact Person	*Mr. V P Pelpola*
Address	*Dessford Estate, Dessford*
Title	*Senior Manager*
Telephone	*0772919344*

Fax	*0112627782*
E-mail	*Dessford@ttel.hayleys.com*

Organization Name	*Moragalla Estate*
Role in the project	*Contractor for supply, installation and commissioning of Solar PV system at Moragalla Estate.*
Contact Person	*Mr. D I N I De Silva*
Address	*Moragalla Estate, Moragalla*
Title	*Deputy Manager (In-charge)*
Telephone	*0772919302*
Fax	*0112627782*
E-mail	*Moragalla@ttel.hayleys.com*

1.5. Location of Project Activity

Location of Project Activity	*Bearwell Estate*
Province	*Central Province*
District	*Nuwara eliya District*
DS Division	*Nuwaraeliya*
City/Town	*Talawakelle*
Community	*Upcountry*
Coordinates	*6.93252 N, 80.68022 E*

Location of Project Activity	*Calsay Estate*
Province	*Central Province*
District	*Nuwaraeliya District*
DS Division	*Nuwaraeliya*

City/Town	*Talawakelle*
Community	*Upcountry*
Coordinates	*6.94275 N, 80.65914E*

Location of Project Activity	*Dessford Estate*
Province	*Central Province*
District	*Nuwara Eliya District*
DS Division	*Nuwaraeliya*
City/Town	*Talawakelle*
Community	*Upcountry*
Coordinates	*6.94284 N, 80.66903 E*

Location of Project Activity	*Deniyaya Estate*
Province	*Southern Province*
District	*Matara District*
DS Division	*Deniyaya*
City/Town	*Deniyaya*
Community	*Low country*
Coordinates	*6.12235 N, 80.42455 E*

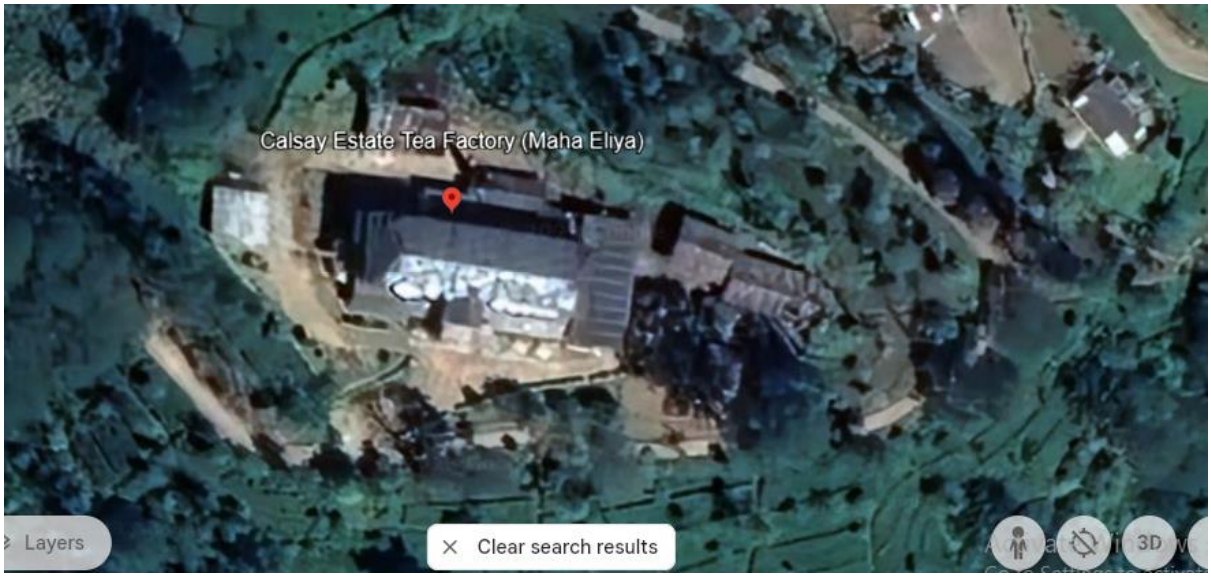
Location of Project Activity	*Moragalla Estate*
Province	*Uva Province*
District	*Badulla District*
DS Division	*Imaduwa*

City/Town	*Deniyaya*
Community	*Low country*
Coordinates	*6.3377952 N, 80.5622228 E*

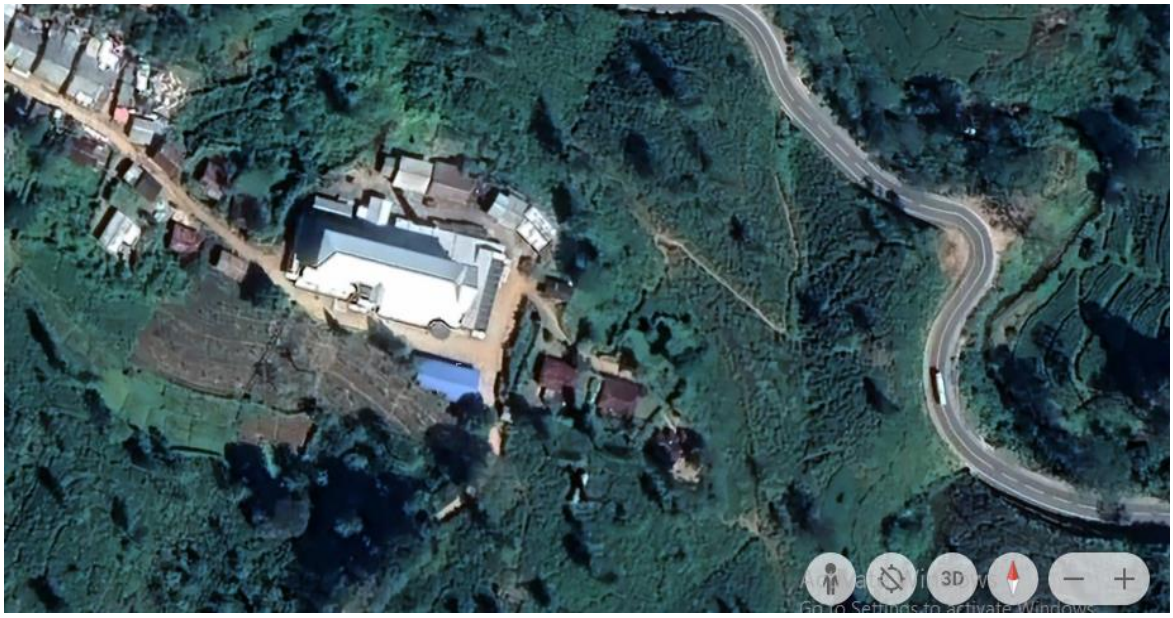
Locations of the sites are indicating in the following maps,

Bearwell Tea Factory

Calsay Tea Factory



Dessford Tea Factory



Moragalla Tea Factory

Deniyaya Tea Factory

1.6. Project Ownership

The project fully owned by the Talawakelle Tea Estates PLC.

1.7. Project Fundings

SITE NO	SITE LOCATION	FUND
01	Bearwell Estate	No Fund / Own Investment
02	Deniyaya Estate	No Fund / Own Investment
03	Moragalla Estate	No Fund / Own Investment
04	Calsay Estate	No Fund / Own Investment
05	Dessford Estate	No Fund / Own Investment

1.8. Project Start Date

SITE NO	SITE LOCATION	PROJECT START DATE
1	Bearwell Estate	16/08/2017
2	Deniyaya Estate	05/08/2021
3	Moragalla Estate	15/07/2019
4	Calsay Estate	06/02/2022
5	Dessford Estate	03/02/2022

1.9. Project Commissioning Date

SITE NO	SITE LOCATION	PROJECT COMMITIONING DATE
1	Bearwell Estate	31/10/2017
2	Deniyaya Estate	18/09/2021
3	Moragalla Estate	17/10/2019
4	Calsay Estate	07/03/2022
5	Dessford Estate	07/03/2022

1.10. Project Track

The project activity intends to be registered under TRACK II, and issued carbon credits from project will only be used for internal offsetting of emissions.

1.11. Project Crediting Period

The crediting period is the period for which the credits for emission reductions are expected. A maximum of seven years from 01/08/2021 to 31/07/2028 which may be renewed at most two times provided that, for each renewal, a designated operational entity recognized by SLCCS determines and informs the Executive Board that the original project baseline is still valid or has been updated taking account of new data where applicable.

1.12. Scale of Project and Estimated Emission

Project Scale	
Small	✓
Large	

Year	Estimated GHG emission reductions or removals (tCO_2e)
01.08.2021-31.07.2022	351
01.08.2022-31.07.2023	465
01.08.2023-31.07.2024	465
01.08.2024-31.07.2025	465
01.08.2025-31.07.2026	465
01.08.2026-31.07.2027	465
01.08.2027-31.07.2028	465
Total estimated ERs	3,141
Total number of crediting years	07
Average annual ERs	448

1.13. Description of the Project Activity

Bearwell

Item	Parameter	Value
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	328 Nos
	Peak Wattage	330 Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	108.24 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400 V
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
Over- Current	DC Fuse make	Not applicable
Protection Device	Dc Fuse ratings	Not applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250 A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Calsay

Item	Parameter	Value
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	205 Nos
	Peak Wattage	535 Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	109.675 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400 V
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
Over- Current	DC Fuse make	Not applicable
Protection Device	Dc Fuse ratings	Not applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250 A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250 A
Documents and Drawings	Complete final drawings	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Dessford

Item	Parameter	Value
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	213 Nos
	Peak Wattage	535 Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	113.955 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400 V
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
Over- Current	DC Fuse make	Not applicable
Protection Device	Dc Fuse ratings	Not applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250 A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250 A
Documents and Drawings	Complete final drawings	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Deniyaya

Item	Parameter	Value
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	223 Nos
	Peak Wattage	530 Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	118.19 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400 V
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
Over- Current	DC Fuse make	Not applicable
Protection Device	Dc Fuse ratings	Not applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250 A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250 A
Documents and Drawings	Complete final drawings	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

Moragalla

Item	Parameter	Value
PV Panel	Manufacturer/Made by	Jinko solar PV polycrystalline modules
	Model	Eagle 72 series/330W STC rating
	Amount installed	352 Nos, 73 Nos
	Peak Wattage	325 Wp, 455 Wp
	Output voltage under rated conditions	-
Inverter	Manufacturer/Made by	SMA-sunny Tripower
	Model and amount	20000TL three phase inverter
	Total capacity	147.615 kWp
Cabling	DC Side Cables	Phoenix Germany
	AC Side Cables (inverter out cables)	Phoenix Germany
	AC Cables to main breaker	Phoenix Germany
	DC Side surge arrestor make	Phoenix Germany
	DC side Surge arrestor response current	15kA to 40kA
	AC side surge arrestor make	Phoenix Germany
	AC side Surge arrestor response current	4-pole 400V
Earthing	Earth resistance	= 2Ω
	Solar panel earth cables	Phoenix Germany
	Cables to earth rods	Phoenix Germany
Over- Current	DC Fuse make	Not applicable
Protection Device	Dc Fuse ratings	Not applicable
	AC side breaker make from inverter to panel	Schneider
	AC side breaker rating from inverter to panel	250 A
	Main breaker makes and model at the CEB connection point	Schneider
	Main breaker rating at the CEB connection point	250A
Documents and Drawings	Complete final drawings	Available
	Datasheet and Manuals	Available
	Warranty certificates	Available
	Test certificates if any	Not Applicable

1.14. Conditions Prior to Project Initiation

Prior to this project initiation there were no solar power plants at the TTEL factory sites.

The Rooftop solar PV bundle project aims to introduce and promote the use of solar photovoltaic technology as an alternative and clean energy source. By deploying solar panels and harnessing solar energy, the project intends to generate electricity without emitting greenhouse gases directly.

1.15. Compliance with Laws, Statutes and Other Regulatory Frameworks

This project is in compliance with all Permits and Approvals, Grid Connection Regulations, Environmental Regulations, Building Codes and Standards, Power Purchase Agreements, Tax and Financial Regulations any relevant local, regional, and national laws, statutes, and regulatory frameworks.

1.16. Participation under Other GHG Programs

The project activity has not registered under any other program.

1.17. Other forms of Credit

This project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

1.18. Sustainable Development

Talawakelle Tea Estate PLC's establishment of a solar PV bundle project can contribute to achieving nationally stated sustainable development priorities in several ways.

Renewable Energy Transition: The solar PV bundle project promotes the use of renewable energy sources, thereby contributing to the transition to a low-carbon economy. This aligns with sustainable development priorities related to clean energy generation, reducing greenhouse gas emissions, and mitigating climate change.

Energy Security and Access: By generating electricity from solar energy, the project can enhance energy security and access. It provides a decentralized and reliable source of power, reducing dependence on fossil fuel imports and improving energy resilience in the region. This aligns with sustainable development priorities related to energy access, affordability, and reliability.

Environmental Stewardship: The solar PV bundle project reduces greenhouse gas emissions and air pollution compared to conventional energy sources. It also minimizes the environmental impacts associated with fossil fuel extraction and combustion. By promoting sustainable practices, the project aligns with sustainable development priorities related to environmental conservation, biodiversity protection, and sustainable resource management.

Regarding monitoring and reporting, the project may include provisions to track its contribution to sustainable development priorities. This can involve:

Monitoring of Electricity Generation: Regular monitoring of the solar PV system's electricity generation can provide data on the project's clean energy production and its contribution to reducing greenhouse gas emissions.

Reporting on Environmental Benefits: The project may report on the estimated emissions reductions achieved, highlighting the positive environmental impact of displacing conventional energy sources.

Socio-Economic Indicators: The project can track and report on socio-economic indicators such as job creation, local procurement, and community benefits to demonstrate its contribution to economic development and social well-being.

Compliance and Regulatory Reporting: The project may need to comply with reporting requirements set by local authorities or regulatory bodies. This can include reporting on energy generation, environmental compliance, and any specific sustainability indicators or targets.

1.19. Leakage Management

In the context of a Solar PV bundle project, leakage refers to the potential unintended negative impacts or risks associated with the project's activities. Leakage management involves identifying, assessing, and implementing measures to minimize or mitigate these risks. Here are some considerations for a leakage management plan and risk mitigation measures for a Solar PV bundle project:

Grid Connection and Electrical Safety: Ensure that the solar PV system is properly connected to the electrical grid and meets all safety standards. Leakage management in this context involves measures to prevent electrical faults, short circuits, and other risks that could lead to potential safety hazards or damage to the system.

Waste Management: Develop a waste management plan to handle any waste generated during the project's lifecycle. This includes the proper segregation, recycling, or disposal of construction materials, packaging waste, and end-of-life components of the solar PV system. Minimizing waste generation and promoting recycling practices are key elements of effective leakage management.

Community Engagement and Social Impacts: Identify potential social impacts and ensure active community engagement throughout the project's lifecycle. Leakage management includes measures to address any social risks, such as impacts on local livelihoods, cultural heritage, or community well-being. This can involve consultation, information sharing, and implementing social initiatives to maximize positive social outcomes.

Monitoring and Compliance: Implement a monitoring system to track the project's activities, assess potential leakage points, and evaluate the effectiveness of mitigation measures. Regular monitoring helps identify any deviations from the plan and allows

for timely corrective actions. Compliance with relevant regulations, standards, and permits is essential to ensure effective leakage management.

Since this project is a rooftop project leakage management is not applicable for Solar PV Bundled project developed by Talawakelle Tea Estates PLC.

1.20. Commercially Sensitive Information

No commercially sensitive information has been included in this project scope.

2. Environment Impacts

2.1. Analysis of environmental impacts

As the project has been carried out in already constructed structures, all the structures have been constructed under approvals for all prevailing terms, and regulations govern in Sri Lanka, specially for solar PV project does not require the analysis of environmental impact assessment. Therefore, under prevailing regulations in Sri Lanka, the project has been implemented.

2.2. Environmental impact assessment

Environmental protection laws established in Sri Lanka does not require rooftop Solar PV systems to obtain environmental impact assessment. Therefore environmental impact assessment was not conducted for the current project activity.

3. Local Stakeholder Consultation

3.1. Stakeholder Consultation Process

The comments by local stakeholders have been invited in an open and transparent manner. A summary of the comments received has been provided including, how due account was taken of the comments received. The local stakeholder consultation meeting for the project activity has been conducted from 1:00 p.m. to 2:00 p.m. on 03/06/2017 at the Head Office of Talawakele Tea Estate PLC.

3.2. Summary of Comments Received

Meeting started with opening speech by representative of project participant. The representative of project participant explained technical aspects of project to stakeholders. He also explained about social, environmental & economic benefits of the project. He also elaborated about its requirement for the current project.

No negative comments have been received in context of the project. Stakeholders were supportive for the implementation of the project and they believe that solar power project is environmentally safe and may help them.

Other issues discussed during the meeting are as follows:

- Job opportunities during day - to - day maintenance and security of project site.
- Preference for local people for job opportunity
- Other work pertaining to these projects will help the local villagers also such as hiring of transport services, civil contracts, etc

3.3. Consideration of Comments Received

Query	Response
The local residents – Raised concern about the effect on human health due to radiation and increased temperature due to implemented solar power project activity.	Clarified that there is no radiation and temperature increase which will affect the surrounding environment and human health due to implementation of the project activity. And also being small scale project activity the project activity does not require any Environmental impact analysis
A freedom fighter raised his concern about preference for local people in employment at project site.	Clarified that project contributed for social well-being on its small way by generating few job opportunities during the initial stage of project development (e.g. civil works, construction activity) and during the operation of the project activity local people will be given preference for job opportunities like Security, O & M work etc.
Workers - Raised concern about free electricity	He clarified that installed solar power plant is grid connected project activity, and project activity will help power deficit that state grid in order to decrease power shortage.
Preference for employees in employment at project site.	Stakeholders accepted the assurance given by the project proponent.

4. Eligibility Criteria

4.1. General Criteria

Sub Section	Eligibility Criteria	Project Activity	Yes/No

4.1.1	The project activity shall be a new project, which will reduce/absorb GHG emissions or the project activity shall be a project, which was implemented on or after 2010 in order to offset GHG emission within the organization.	*Project activity is a new project designed and implemented to reduce GHG emission.*	*Yes*
4.1.2	The project activity shall not happen in the absence of benefits received from trading Sri Lanka Certified Emission Reduction units (SCERs). *(This is not applicable Track II)*	*SCERs are used for in-house offset*	*N/A*
4.1.3	The project shall be implemented voluntarily by the project owner but not implemented based on legislation or regulations in the country	*Project initiated by Talawakelle Tea Estate PLC as a voluntary Commitment.*	*Yes*
4.1.4	The project activity satisfies environmental standard and regulations of the country	*Project will be complied to all the relevant standards and regulations in Sri Lanka.*	*Yes*
4.1.5	The project shall not have been registered under any other national or international scheme. However, if a registered project under other scheme is willing to register with SLCCS, then, such project shall be deregistered from the other scheme in order to be eligible	*The project not have been registered under any other national or international scheme.*	*Yes*

4.2. Bundling Criteria

Sub Section	Eligibility Criteria	Project Activity	Yes/No
4.2.1	The composition of bundles shall not change over time	-	*Yes*
4.2.2	All project activities in the bundle shall have the same crediting period	-	*Yes*

4.2.3	All components of the bundled project shall have the same baseline.	*Roof top type solar system*	*Yes*
4.2.4	All components of the bundled project shall have the same project type, methodologies and technology/ measure	*Roof top type solar system*	*Yes*
4.2.5	Maximum number of components per bundle shall be seven.	*5* components	*Yes*
4.2.6	Maximum capacity of a component of the bundled project shall be less than 1.5 MW.	*597.675 kWp*	*Yes*

5. Application of Methodology

5.1. Title and Reference of Methodology

Title: Grid connected renewable electricity generation
Reference: AMS I.D./Version 18/EB 81

5.2. Applicability of Methodology

The projects which introduced in this report are all new Solar PV projects that are applicable under clause 4 (a) of the AMS I.D/Version 18/EB 81. All the projects' sites are new installation of Solar PVs mounted on already constructed, therefore, all sites come under the applicability.

5.3. Project Boundary

The project's defined boundary covers both the physical location of the solar PV plants This includes the solar PV arrays, inverters, transformers, and metering/substation systems. The illustration below provides a visual representation of this project scope.

Source		Gas	Included?	Justification/Explanation
Baseline	Emissions of fossil fuel from	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source

Source		Gas	Included?	Justification/Explanation
	each source	Other	No	Minor emission source
Project	Solar power generation activity from each source	CO_2	No	Minor emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	Minor emission source

5.4. Baseline Scenario

According to this project, the project component sites are located in different areas and commenced operations in different time horizons. The validation process began in 2023, retroactively considering the previous two years and calculating under the year 2021.

Assessment team confirms that being a grid connected solar energy generation project, based on the Methodology AMS.I.D version 18 As per methodology if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The project activity involves setting up of solar power projects to harness the power of sun to produce electricity and supply to the national grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the grid. Hence, the baseline for the project activity is the equivalent amount of power from the national grid.

The baseline scenario assumes that the electricity contributed to the grid by the project activity would have originated either from the ongoing operation of grid-connected power plants or from the integration of new generation sources into the grid.

In essence, the project's impact on emission reductions is measured by the amount of grid electricity it replaces and how this displacement aligns with the actual generation mix within the grid system.

5.5. Additionality

The project is intended to be registered under track II. Therefore, additionality is not necessary to be demonstrated.

5.6. Methodology Deviations

Not Applicable

6. Quantification of GHG Emission Reductions and Removals

6.1. Baseline Emissions

As per applied methodology, the baseline emission is the product of electrical energy baseline expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor. A baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors are extracted by Table 9.4 and Figure 9.1: Grid Emission Factors of Sri Lanka by Energy balance 2020 published by Sri Lanka Sustainable Energy Authority.

The equations are as follows:

$$\mathbf{BE_y = EG_y \times EF_y}$$

Where:

EG_y = Quantity of net electricity supplied to the grid as a result of the implementation of the Clean Development Mechanism (CDM) project activity in year y (MWh).

EF_y = Combined margin CO_2 Emission factor of the grid connected power generation in the year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO_2e/ MWh)

BE_y = Baseline Emissions in year y (tCO_{2e})

6.2. Project Emissions (PE_y)

The technology employed for current solar PV bundled project is rooftop solar PV systems. In the optimum level of operation, they do not require to be aided by the auxiliary systems such as standby generator or complex mechanical systems. Therefore, project emissions to be reported for this project activity is Zero.

$PE_y = 0$

6.3. Leakage

Leakage due to transfer of equipment from another activity. The equipment installed in the project activity is not transferred from any other activity. Hence leakage for this part is zero.

$LE_y = 0$

6.4. Net GHG Emission Reductions and Removals

Emission Reductions & Removals = Baseline Emissions – Project Emissions - Leakage Emission

Where:

Baseline Emissions represent the estimated emissions that would occur in the absence of the project or intervention.

Project Emissions represent the estimated emissions associated with the project or intervention.

Since

$LE_y = 0$; $PE_y = 0$;

Therefore,

Emission reduction = Baseline Emissions in year (tCO_{2e})

Site No.	Location	Capacity (kWp)	Date of Commission
1	Bearwell Estate	108.24 kWp	31.10.2017
2	Calsay Estate	109.675 kWp	07.03.2022
3	Dessford Estate	113.955 kWp	07.03.2022

4	Deniyaya Estate	118.19 kWp	18.09.2021
5	Moragalla Estate	147.615 kWp	17.10.2019
	Total Capacity (Tc)	597.675 kWp	

Summary of emission reduction calculation

Parameter	Deniyaya	Moragalla	Bearwell	Calsay	Dessford	Unit
Project Capacity	118.19	147.615	108.24	109.675	113.955	kWp
Plant Factor	11.85	11.50	12.20	12.24	13.27	%
Average Energy Output (EG_y)	122.69	148.70	115.68	117.63	132.50	MWh/Year
Grid Emission Factor (EF_y)	0.7298	0.7298	0.7298	0.7298	0.7298	tCO_2/MWh
Emission Reduction (ER_y)	89.53	108.52	84.42	85.84	96.69	tCO_2/Year

The Grid Emission Factor used in this analysis was obtained from Sustainable Energy Authority publications. The latest available version of the Grid Emission Factor referenced is from the year 2020.

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2021 Aug - 2022 July	351	0	0	351
2022 Aug - 2023 July	465	0	0	465
2023 Aug - 2024 July	465	0	0	465
2024 Aug - 2025 July	465	0	0	465
2025 Aug - 2026 July	465	0	0	465
2026 Aug - 2027 July	465	0	0	465
2027 Aug - 2028 July	465	0	0	465
Total	3,141	0	0	3,141
Total number of crediting years	7 years			
Annual average over the crediting period	448	0	0	448

7. Monitoring

7.1. Data and Parameters Available at Validation

The responsibilities of various personnel in the organization in keeping records as follows;

Real-Time monitoring software is available from 2021 year onwards at Head office where Net plus system is installed and these details can be used for validation of electricity generation.

However real time monitoring system at Talawakelle monitored by IT department where Net plus system is installed is on operation after 2021 year and it is proposed to use estimated generation based on the system parameters and available real time monitoring details at the verification.

Since all other sites are operated under Net Plus scheme relevant energy generation and exporting to the CEB grid can be verified by taking at monthly readings of generation levels and bills issued by the CEB.

The verifier will also be welcome to visit the power station sites to confirm the status of operations. No leakage effects are applicable to the plant's operation as the equipment at the plant has not been moved from any other operational location.

Data / Parameter	Grid emission factor (EFy)
Data unit	*tCO_2/MWh*
Description	*Combined margin CO_2 emission factor for grid connected power generation in year y*
Source of data	*Table 9.4 and Figure 9.1: Grid Emission Factors of Sri Lanka by Energy balance 2020 published by Sustainable Energy Authority*
Value applied	*0.7298 tCO_2e/MWh*
Justification of choice of data or description of measurement methods and procedures applied	*Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors.*
Purpose of Data	*Calculate the emission reduction*

7.2. Data and Parameters Monitored

Data / Parameter	Average Energy Output (EGy)
Data unit	*MWh/year*
Description	*Quantity of net electricity export to the grid as a result of the implementation of the proposed projects activity in the year for the 05 numbers of projects.*
Source of data	*This parameter is continuously monitored and recorded. Monthly electricity export voucher issued by CEB/LECO or available real time monitoring software can use to recheck.*
Description of measurement methods and procedures to be applied	*Net electricity supplied to the grid would be calculated based on export & import data (Net electricity supplied to grid = Export electricity – Import electricity) when net plus connection is available all the generated electricity will be export to the Grid where Net Plus connections are available. The export or/and import energy are measured continuously using Main meter when Net Plus system available and Real Time software will use at Net plus system available sites and readings of meters/portal shall be taken on monthly basis at appointed day and hour (time) by authorized officer and recorded in log book on monthly basis.*
Frequency of monitoring/recording	*Monthly*
Value applied	*122.69 MWh/year for Deniyaya (total value)* *148.70 MWh/year for Moragalla (total value)* *115.68 MWh/year for Bearwell (total value)* *117.63 MWh/year for Calsay (total value)* *132.50 MWh/year for Dessford (total value)*
Monitoring equipment	*Energy meter* *Accuracy class of the meter class 01.*
QA/QC procedures to be applied	*The meter is properly calibrated and maintained in order to ensure accuracy. Testing/Calibration interval: Annually by*

	CEB; Cross checking of the data with the cheque received from CEB for exported electricity to the grid
Purpose of data	*Calculate baseline emission*
Calculation method	*Direct observation*
Comments	*The recorded data will be checked periodically by the Estate Manager*

7.3. Monitoring Plan

The TTEL Solar PV Bundle Project, installed by Hayleys Fentons (Pvt), utilizes SMA inverters that grant access to SMA's online portal for real-time system monitoring. Monthly production details are observed, and any performance deviations are promptly identified and reported to the CEB for rectification. In regional sites, Estate Managers oversee data records, ensuring their completeness and reliability, including equipment calibration and parameter recording. They communicate with the Head office general managers. Initial technical training and knowledge-sharing sessions have taken place, with plans for further sessions to enhance solar power generation and technical understanding.

Regarding document control, the following procedures are adhered to:

- Documents are securely stored, either electronically or physically, with controlled access.

- Only authorized individuals can view or modify documentation, with all changes documented in a log book.

- All records and payments strictly adhere to the rules and regulations set forth by Talawakelle Tea Estate PLC.

8. Annexures

Annexure 01 : Estimated Emission Reduction Calculation

Commissioning Date		2021 Sep	2019 Oct	2017 Oct	2022 Mar	2022 Mar	
		Deniyaya	**Moragalla**	**Bearwell**	**Calsay**	**Dessford**	**Total**
Capacity	**kWh**	118.19	147.615	108.24	109.675	113.955	597.675
Plant Factor	**%**	11.85	11.50	12.20	12.24	13.27	
Estimated ER	**tCO_2e/year**	89.53	108.52	84.42	85.84	96.69	465.00
2021	**Aug - Dec (5 months)**	37.30	45.22	35.18	35.77	40.29	193.75
2022	**Jan - Dec (12 months)**	89.53	108.52	84.42	85.84	96.69	465.00
2023	**Jan - Jul (7 months)**	52.23	63.30	49.25	50.07	56.40	271.25
Estimated Emission Reduction for Monitoring Period							**930.00**
For CMA	**Year**	**Deniyaya**	**Moragalla**	**Bearwell**	**Calsay**	**Dessford**	**Total**
2021 Aug - 2022 July	1	82.07	108.52	84.42	35.77	40.29	351.06
2022 Aug - 2023 July	2	89.53	108.52	84.42	85.84	96.69	465.00
2023 Aug - 2024 July	3	89.53	108.52	84.42	85.84	96.69	465.00
2024 Aug - 2025 July	4	89.53	108.52	84.42	85.84	96.69	465.00
2025 Aug - 2026 July	5	89.53	108.52	84.42	85.84	96.69	465.00
2026 Aug - 2027 July	6	89.53	108.52	84.42	85.84	96.69	465.00
2027 Aug - 2028 July	7	89.53	108.52	84.42	85.84	96.69	465.00
Total Estimated ER for crediting period							3,141.06
Average annual Estimated ER							448.72

Deniyaya			
Parameter	**Value**	**Unit**	**Source**
Project Capacity	0.11819	MW	Proposed capacity
Plant Factor	11.85	%	Professional Judgement
Average Energy Output	122.69	MWh/year	Calculated
Grid Emission Factor ($EF_{CM,Grid,y}$)	0.7298	tCO_2e/MWh	Energy Balance-2020, SLSEA
Emission Reduction (ERy)	89.53	tCO_2e/year	Calculated

Moragalla			
Parameter	**Value**	**Unit**	**Source**
Project Capacity	0.147615	MW	Proposed capacity
Plant Factor	11.50	%	Professional Judgement
Average Energy Output	148.70	MWh/year	Calculated
Grid Emission Factor ($EF_{CM,Grid,y}$)	0.7298	tCO_2e/MWh	Energy Balance-2020, SLSEA
Emission Reduction (ERy)	108.52	tCO_2e/year	Calculated
Bearwell			
Parameter	**Value**	**Unit**	**Source**
Project Capacity	0.10824	MW	Proposed capacity
Plant Factor	12.20	%	Professional Judgement
Average Energy Output	115.68	MWh/year	Calculated
Grid Emission Factor ($EF_{CM,Grid,y}$)	0.7298	tCO_2e/MWh	Energy Balance-2020, SLSEA
Emission Reduction (ERy)	84.42	tCO_2e/year	Calculated
Calsay			
Parameter	**Value**	**Unit**	**Source**
Project Capacity	0.109675	MW	Proposed capacity
Plant Factor	12.24	%	Professional Judgement
Average Energy Output	117.63	MWh/year	Calculated
Grid Emission Factor ($EF_{CM,Grid,y}$)	0.7298	tCO_2e/MWh	Energy Balance-2020, SLSEA
Emission Reduction (ERy)	85.84	tCO_2e/year	Calculated
Dessford			
Parameter	**Value**	**Unit**	**Source**
Project Capacity	0.113955	MW	Proposed capacity
Plant Factor	13.27	%	Professional Judgement
Average Energy Output	132.50	MWh/year	Calculated
Grid Emission Factor ($EF_{CM,Grid,y}$)	0.7298	tCO_2e/MWh	Energy Balance-2020, SLSEA
Emission Reduction (ERy)	96.69	tCO_2e/year	Calculated

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