Sri Lanka® Carbon Crediting Scheme

Monitoring Report

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*
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Project proponent/s	*Talawakelle Tea Estates PLC*
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1. Description of Project Activity

1.1. Objective of the Monitoring

The objective of monitoring is to accurately quantify the actual reduction of greenhouse gas emissions over a specific timeframe, enabling informed decisions regarding carbon neutrality. The project developer holds the responsibility to define the monitoring period. The monitoring report serves as a crucial document supporting the independent verification of the net reduction in greenhouse gas emissions during the specified period, ultimately leading to the acquisition of Sri Lankan Certified Emission Reductions(SCERs).

1.2. Summary Description of the Implementation of this Project

Talawakelle Tea Estates PLC has implemented grid connected solar PV bundle project with the total cumulative capacity of 597.675 kWp in five tea Estates, Bearwell, Calsay and Desfford Estates located in Up-country, Talawakelle Region and Moragalla, Deniyaya Estates located in low country, Deniyaya and Galle regions. The electricity generated from the project activity is being exported to the national grid and sold to Ceylon Electricity Board under a Standard Power Purchase Agreement. Talawakelle Tea Estates PLC has selected net plus solar power systems technology for its solar PV bundle project. The purpose of this project was to generate solar power through installing solar PV on rooftop of five tea factories owned by Talawakelle Tea Estates PLC, and register these projects as a renewable energy generation bundle project under Sri Lanka Carbon Crediting Scheme (SLCCS). When all projects are operational, the bundle project activity is generating about 637.2 MWh of solar power annually and exports to national CEB grid. The monitoring period considered for this monitoring report is 01/08/2021 – 31/07/2023 and the expected and actual GHG emission reductions are 930 tCO_2e and 775 tCO_2e respectively.

1.3. Sectoral Scope and Project Type

Most of the proposed projects in CDM Sri Lanka come under small scale methodologies Type 1 Category 1.D which is renewable power generation for a grid is mostly relevant to project activity entails with renewable energy generation using the rooftop solar photovoltaic systems and applicable to be registered under SLCCS in accordance with the small scale methodologies of CDM – AMS -1.D (Version 18.0) Grid Connected renewable energy generation.

1.4. Project Proponent

Organization Name	*Talawakelle Tea Estates PLC*
Contact Person	*Mr. Krishna Ranagala*
Title	*Deputy General Manager - Sustainability & QSD*
Address	*No. 400, Deans Road, Colombo 10.*
Telephone	*011-2627754, 011-2697203*
Fax	-
E-mail	*Krishna.Chathuranga@ttel.hayleys.com*

1.5. 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*
Title	*Snr. D.G.M*
Address	*Bearwell Estate, Bearwell*
Telephone	*0772919375*
Fax	*011 262 7782*
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*
Title	*Deputy Manager – In-charge*
Address	*Calsay Estate, Calsay*
Telephone	*0772435557*

Fax	*011 262 7782*
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*
Title	*Manager*
Address	*Deniyaya Estate, Deniyaya.*
Telephone	*0772919420*
Fax	*011 262 7782*
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*
Title	*Snr. Manager*
Address	*Dessford Estate, Dessford*
Telephone	*0772919344*
Fax	*011 262 7782*
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*
Title	*Dpty. Manager (In-charge)*

Address	*Moragalla Estate, Moragalla*
Telephone	*0772919302*
Fax	*011 262 7782*
E-mail	*Moragalla@ttel.hayleys.com*

1.6 Project Start Date

No	Site Location	Project Start Date
01	*Bearwell estate*	*16/08/2017*
02	*Calsay estate*	*06/02/2022*
03	*Desfford estate*	*03/02/2022*
04	*Deniyaya estate*	*05/08/2021*
05	*Moragalla estate*	*15/07/2019*

1.7 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 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.

1.8 Registration date of the project activity

The project was registered under SLCCS on 01st August 2023.

1.9 Project track and credit use

The project activity is registered under TRACK II, since all project activities have been started newly with the objective of generating renewable energy and GHG emission reductions. The offsets achieved through the project activity is used either for internal offsetting or trading purposes.

1.10 Project Location

Location of Project Activity	*Bearwell Estate*
Province	*Central Province*
District	*Nuwaraeliya 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, 80.65914 E*

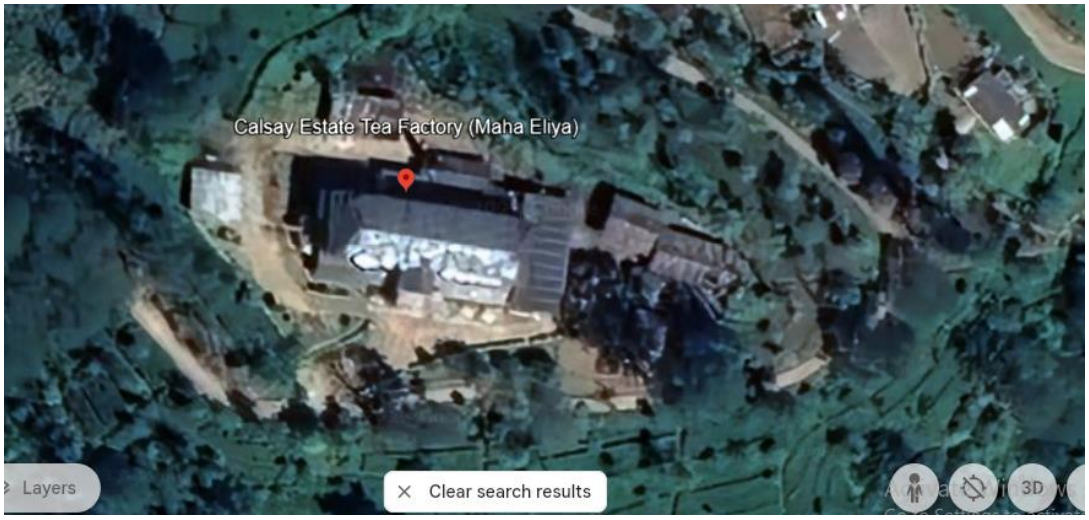
Location of Project Activity	*Dessford Estate*
Province	*Central Province*
District	*Nuwara Eliya District*
DS Division	*Nuwaraeliya*
City/Town	*Talawakelle*
Community	*Upcountry*
Coordinates	*6.94284 N, 80.66903 E*

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*

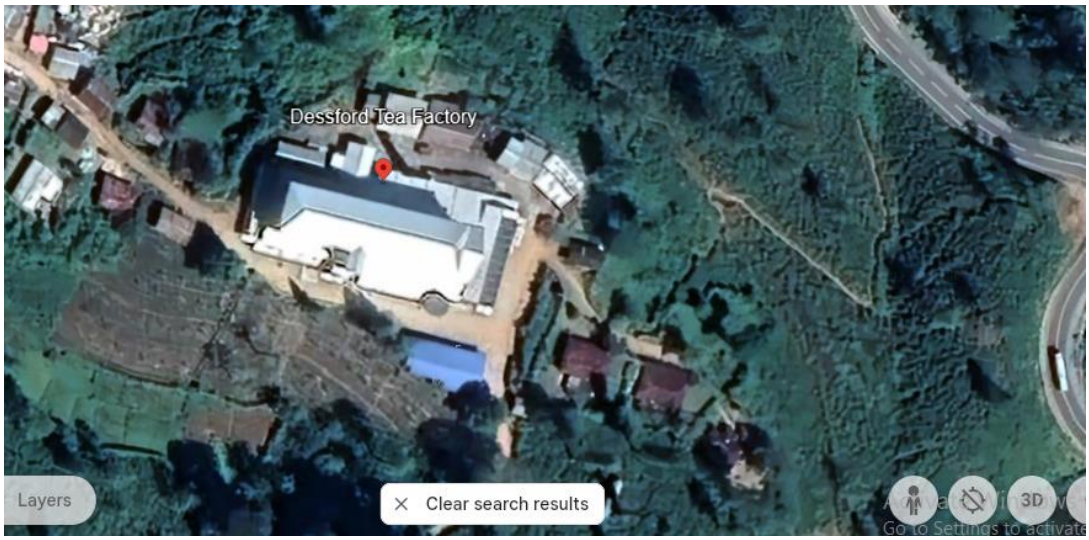
Location of Project Activity	*Moragalla Estate*
Province	*Uva Province*
District	*Badulla District*
DS Division	*Imaduwa*
City/Town	*Deniyaya*
Community	*Low country*
Coordinates	*6.3377952 N, 80.5622228 E*

Bearwell Tea factory

Calsay Tea Factory



Dessford Tea Factory



Moragalla Tea Factory

Deniyaya Tea Factory

1.11 Title and Reference of Methodology

Title: Grid connected renewable electricity generation Reference

Methodology: CDM- AMS-1.D/Version 18.0/EB 81

EB 81, Annex 24
Revision to:

- Introduce the methodological tool “Project emissions from cultivation of biomass”;
- Streamline procedure to estimate project emissions associated with biomass cultivation across large and small scale methodologies;
- Remove restrictions for application in a PoA;
- Include the changes recommended in SSC_591 and SSC_558;
- Streamline procedure for retrofit and capacity addition with ACM0002.

1.12 Participation under other GHG Programs

The project activity has not been registered under any other program.

1.13 Other Forms of Credits

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

1.14 Sustainable Development

Thalawakelle 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.

2. Implementation Status

2.1 Implementation Status of the Project Activity

There is no any new implementations or changes and operational status is same as before the monitoring period of the project.

2.2 Deviations

2.2.1 Methodology Deviations

No change in methodology and Methodology AMS-I.D Version 18.0 is further applicable.

2.2.2 Project Description Deviations

No any changes

3 Safeguards

3.1 Total Impact

As the project has been carried out in already constructed structures and all the structures have been constructed under approvals for all prevailing terms and regulations govern in Sri Lanka,

especially for rooftop solar PV project does not require the analysis of environmental impact assessment. Therefore, under prevailing regulations in Sri Lanka, the project has been implemented.

3.2 Local Stakeholder Consultation

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.

3.3 AFOLU-Specific Safeguards

Not Applicable

4. Data and Parameters

4.1 Data and Parameters Available at Validation

Data / Parameter	*Grid emission factor (EF_y)*
Data unit	*tCO_2e/ MWh*
Description	*Grid emission factor calculated using methodological tool to calculate the emission factor for an electricity system.*
Source of data	*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	*Calculation of project emissions reduction*
Comments	*This factor was applied to calculate baseline emission reduction of the project activity.*

4.2 Data and Parameters Monitored

Data / Parameter	Average Energy Output (EG)

Data unit	*MWh*
Description	*Quantity of net electricity export to the grid as a result of the implementation of the proposed projects activity in 01 August 2021 to 31 July 2023 for five project activities.*
Source of data	*This parameter was continuously monitored and recorded. Monthly electricity export voucher issued by CEB 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	*Bearwell estate = 232.276 MWh* *Calsay estate = 159.083 MWh* *Desfford estate = 150.453 MWh* *Deniyaya estate = 221.595 MWh* *Moragalla estate = 298.678 MWh*
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	*Calculation of baseline emissions*
Calculation method	*Direct observation*
Comments	-

4.3 Description of the Monitoring Plan

The TTEL Solar PV Bundle Project, installed by Hayleys Fentons Limited, 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 General Manager (CA) through regional 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.

5. Quantification of GHG Emission Reductions and Removals

5.1 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 9.5 and Figure 9.1: Grid Emission Factors of Sri Lanka by Energy balance 2020 published by Sri Lanka Sustainable Energy Authority.

$$\mathbf{B}E_y = EG_y \times EF$$

Where,

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

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 = CO_2 Emission factor of the grid in the year 2020 (tCO_2/ MWh)

5.2 Project Emissions

Project emission may include the emissions associated with the project installation, operation and maintenance. As per the methodology applied, these emissions are not

significant and attributable to the project activity, hence project emissions are reported as zero.

$PE_y = 0$

5.3 Leakage

Leakage occurs 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.

$LE_y = 0$

5.4 Net of GHG Emission Reductions and Removals

The emission reduction achieved by the project activity is the difference between the baseline emission and the sum of the project emission and leakage.

$$\mathbf{ER_y = BE_y – PE_y – LE_y}$$

Since $LE_y = 0$;

$PE_y = 0$;

$ER_y = BE_y$

Therefore,

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

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)
1 August 2021 – 31 December 2021	*102.77*	*0*	*0*	*102.77*
1 January 2022 – 31 December 2022	*387.22*	*0*	*0*	*387.22*
1 January 2023 – 31 July 2023	*285.12*	*0*	*0*	*285.12*
Total	*775*	*0*	*0*	*775*

5.5 Comparison of actual emission reductions with estimates in the CMA

Item	Values applied in ex-ante calculation of the registered CMA	Actual values reached during the monitoring period
Emission reductions (tCO_2e) 01 August 2021 – 31 July 2023	930	775

5.6 Remarks on difference from estimated value in the CMA

The actual emission reduction has not exceeded the ex-ante emission reduction calculation provided in the approved CMA. Therefore, providing a justification is not essential.

6. Annexures

Annexure 01: Grid Emission Factor Calculation - SLSEA Energy Balance Report – 2020

9.1.1 Operating Margin

The Operating Margin (OM) is a concept which includes all power plants which can have reduced outputs due to a project. It specifically excludes 'low cost, must run' power plants, implying that with or without the project, such generation will continue. Table 9.1 gives the Simple Operating Margin (OM).

Table 9.3 – Operating Margin

	2017	2018	2019	2020
Emissions from Power Plants (t-CO_2)	3,438,963.6	2,529,709.6	3,552,816.2	2,960,911.9
Net Electricity Generation (GWh) excluding low-cost must run power plants	4,854.9	3,579.2	5,006.7	4,179.3
Operating margin CO_2 emission factor (kg-CO_2/kWh)				
Three-year generation based weighted average	0.6993	0.7044	0.7084	0.7084

9.1.2 Build Margin

The Build Margin (BM) is a concept which attempts to foretell the happenings of a generation system in future, during the crediting period of a project, considering the recent additions to a generation system.

Table 9.4 – Build Margin

	Unit	2017	2018	2019	2020
Emissions of power plants considered for the BM	tonnes of CO_2	3,595,191.6	3,508,911.2	4,266,621.5	4,067,393.8
Generation of power plants considered for the BM	GWh	3,897.9	4,208.8	5,101.3	5,122.9
Build margin emission factor	kg-CO_2/kWh	0.9224	0.8337	0.8364	0.7940

9.1.3 Combined Margin

The Combined Margin (CM) is a weighted average of OM and BM and is commonly known as the Grid Emission Factor (Table 9.4).

Table 9.5 – Combined Margin (kg-CO_2/kWh)

	2017	2018	2019	2020
For solar, wind Projects	0.7550	0.7368	0.7404	0.7298
All other Projects; 1st crediting period	0.8108	0.7691	0.7724	0.7512
All other Projects; 2nd - 3rd crediting period	0.8666	0.8014	0.8044	0.7726

The OM, BM and CM are required for the assessment of CO_2 emission reductions for projects claiming carbon credits under UNFCC guidelines. The GEF is indicated in Figure 9.1.

Document Information

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