

# GHG Impact Assessment of the CNIS RE Scheme



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# Initiative for Climate Action Transparency - ICAT GHG Impact Assessment of the CNIS RE Scheme

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# List of Abbreviations

Abbreviation	Full Form
<b>AMM</b>	Association of Mauritian Manufacturers
<b>CA</b>	Connection Agreement
<b>CA</b>	Connection Agreement
<b>CEB</b>	Central Electricity Board
<b>CNIS</b>	Carbon Neutral Industrial Sector
<b>KPIs</b>	Key Performance Indicators
<b>MEPU</b>	Ministry of Energy and Public Utilities
<b>MEXA</b>	Mauritius Export Association
<b>MITD</b>	Mauritius Institute of Training and Development
<b>MRV</b>	Monitoring, Reporting, and Verification
<b>MUR</b>	Mauritian Rupee
<b>RE</b>	Renewable Energy
<b>T&amp;Cs</b>	Terms & Conditions
<b>T&amp;Cs</b>	Terms & Conditions
<b>ToU</b>	Unbundled Time-Of-Use
<b>URA</b>	Utility Regulatory Authority
<b>AMM</b>	Association of Mauritian Manufacturers

# Executive Summary

The **Carbon Neutral Industrial Sector (CNIS) Renewable Energy (RE) Scheme** promotes the decarbonization of the industrial sector in Mauritius by allowing eligible industrial customers to act as prosumers and generate solar and wind electricity. The assessment, completed as per the guidance document namely **ICAT Renewable Energy Methodology**, estimates the **CO<sub>2</sub> reductions** that the Scheme achieves while also incorporating examination of how the Scheme is being implemented, the role of stakeholders, and the associated monitoring and evaluation framework.

The assessment was also complemented with an assessment of policy impacts using the Greenhouse Gas Abatement Cost Model (GACMO), one of the tools in ICAT's Toolbox. This was done to compare results in approaches to ensure alignment and potentially identify reasons for discrepancies. The analysis of both ICAT Policy and GACMO illustrates how these two tools complement each other. The GACMO tool provided in this case a valuable tool to make calculations on electricity generation based on a mix of local and general parameters related to solar PV generation, in the absence of data on actual electricity generation attributable to CNIS installations.

Using the **grid emission factor method and the updated 2023 Tier 3 grid emission factor** for Mauritius (0.7521tCO<sub>2</sub> per MWh), the ex-post GHG impact of this Scheme is estimated to be **378,787.64 tCO<sub>2</sub> avoided in the year 2024. Optionally, a baseline year of 2022** was developed to allow for future assessments of the scheme and provide a comparative metric of carbon impact, which showed **2,976,652.56 tCO<sub>2</sub>**.

Finally, a comprehensive list of **Key Performance Indicators** has been proposed to evaluate inputs, activities, intermediate outcomes, and sustainable development outcomes associated with the implementation of the CNIS initiative. This KPIs will serve as a useful resource to support transparent MRV outcomes, further policy understanding, transparency, and contributions toward national climate and renewable energy goals.

# Chapter 1: General Information

The **Carbon Neutral Industrial Sector (CNIS) Renewable Energy (RE) Scheme** is a national policy initiative to accelerate the **decarbonization of the industrial sector** in Mauritius. It offers an organized framework through which eligible industrial customers can produce renewable electricity while still being connected to the national grid. The following table captures the major features of the Scheme.

*Table 1: Key Attributes of the Carbon Neutral Industrial Sector (CNIS) Renewable Energy (RE) Scheme*

Attribute	Details
<b>Name of the Policy</b>	<b>Carbon Neutral Industrial Sector (CNIS) Renewable Energy (RE) Scheme</b>
<b>Type of Policy</b>	Feed-in tariff policy
<b>Assessing Firm</b>	Deloitte India
<b>Date of the Assessment</b>	November 2025
<b>Status of Policy</b>	Implemented
<b>Date of Implementation</b>	30 January 2023
<b>Implementing Entity</b>	Central Electricity Board (CEB)
<b>Level of the Policy</b>	National
<b>Sectors Targeted</b>	Industrial sector (excluding sugar and energy generation sectors)
<b>Greenhouse Gases (GHGs) Targeted</b>	CO <sub>2</sub>
<b>Total Allocated Capacity (Current Phase)</b>	100 MW (Mauritius)
<b>Eligible Technologies</b>	Solar and Wind sources only

# Chapter 2: Objectives of assessing GHG impacts of CNIS RE Scheme

The GHG impact assessment for the scheme *Carbon Neutral Industrial Sector (CNIS) Renewable Energy (RE) Scheme* primarily aims to quantify and report the expected **reductions in CO<sub>2</sub> emissions owing to the displacement of fossil fuel-based electricity generation. The assessment is undertaken basis the guidelines provided by ICAT Renewable Energy Methodology.** On a broader level, this GHG impact assessment aims to do the following:

Demonstrate the contribution of the CNIS Scheme to help Mauritius reach its goal of 2030 carbon neutrality in the industrial sector.

Assist the Government, CEB, and other stakeholders in making decisions about the Scheme's implementation and possible expansion.

Ensure a reporting system that is transparent and accountable regarding the impacts of CNIS.

Facilitate alignment of the policy with national and international climate commitments.

Furthermore, the intended audiences of this GHG impact assessment include the following key stakeholders for the CNIS RE Scheme:

- **Policyholders and Government Agencies:** To ensure alignment with national strategies and climate goals.
- **Energy Regulators:** To ensure compliance with grid and licensing regulations at the national level.
- **Industrial Prosumer Participants:** To understand their expected roles and responsibilities in achieving CO<sub>2</sub> abatements.
- **Investors and Financial Stakeholders:** To consider the probable impacts and associated co-benefits (including but not limited to environmental, socio-economic, etc.) in the financing of Renewable Energy (RE) projects within this scheme.
- **Skilled Technical Experts and Consultants:** To assist with the setting up of RE projects as well as accurate Measurement, Reporting, and Verification (MRV) of CO<sub>2</sub> reductions.

# Chapter 3: Key Relevant Stakeholders

The Carbon Neutral Industrial Sector (CNIS) Renewable Energy (RE) Scheme's successful implementation depends on the coordinated participation of the various stakeholders. Relevant stakeholders can contribute to different areas such as **policy guidance, project implementation, technical supervision, and industry representation** by being involved in different capacities and stages of the scheme implementation. The table below presents the key stakeholders relevant to the CNIS RE Scheme for Mauritius:

Table 2: Key Stakeholders and Their Roles in the CNIS Renewable Energy Scheme – Mauritius

Stakeholder	Relevance to the Scheme
<b>Central Electricity Board (CEB)<sup>1</sup></b>	Implementing agency responsible for managing the CNIS RE Scheme, including approval of the re projects and capacity allocations for different phases of the scheme. Key stakeholders consulted for data procurement for this assessment.
<b>Ministry of Energy and Public Utilities (MEPU)<sup>2</sup></b>	National level Government body overseeing energy policies and supporting the CNIS RE Scheme's alignment with national energy goals.
<b>Mauritius Export Association (MEXA)<sup>3</sup></b>	As a key representative of the Industrial Sector and Association of Mauritian Manufacturers (AMM), MEXA was involved in consultation with MEPU during the development of the CNIS RE Scheme to ensure alignment with industrial needs.
<b>Additional Relevant Stakeholders for the CNIS Scheme</b>	
<b>Mauritius Institute of Training and Development (MITD)</b>	Can provide training and capacity-building for stakeholders involved in the CNIS RE Scheme to help implement the scheme smoothly.
<b>Utility Regulatory Authority (URA)</b>	To approve electricity generation licenses and ensure compliance with energy regulations.
<b>Eligible Industrial Customers (Prosumers)</b>	Install and operate RE facilities and generate electricity for self-consumption and offset excess energy via grid imports.
<b>Financial Stakeholders / Investors</b>	Provide funding or financing for eligible RE projects
<b>Local Communities / Constituents affected</b>	Stakeholders impacted by the project siting, construction, and operations involved either through consultations or approvals.
<b>Technical Service Providers / Consultants</b>	Technical expertise, energy audits, and project implementation support provided to ensure compliance with the grid codes and scheme requirements.
<b>Renewable Energy Equipment Suppliers</b>	Renewable energy infrastructure and metering equipment necessary for the project to be provided for scheme implementation.

Note: The CNIS RE Scheme for Rodrigues will be considered after the Rodrigues Ile Verte study is completed. Stakeholder mapping for Rodrigues can therefore be updated once the outcomes of the study are available.

<sup>1</sup> <https://ceb.mu/projects/carbon-neutral-industrial-sector-cnis-scheme>

<sup>2</sup> <https://publicutilities.govmu.org/Documents/Annual%20Report2023-2024.pdf>

<sup>3</sup> <https://ceb.mu/projects/carbon-neutral-industrial-sector-cnis-scheme>

# Chapter 4: Policy Description

## 4.1 About The Policy

### Policy Background and Rationale

The **Carbon Neutral Industrial Sector (CNIS) Renewable Energy Scheme** was launched to help accomplish the Government of Mauritius' pledge of becoming **carbon neutral in the industrial sector by 2030**, as set out under Measures 194 to 199 of the National Budget 2022–2023.

- The Scheme aligns with the national goal of achieving a **60% Renewable Energy (RE) contribution in electricity generation by 2030**, as set out under the Renewable Energy Transition Framework.
- It was developed post consultation led by the **Ministry of Energy and Public Utilities (MEPU)** key industry stakeholder namely **Mauritius Export Association (MEXA)**, a key representative of Association of Mauritian Manufacturers (AMM).
- The **Central Electricity Board (CEB)** serves as the key implementing agency.
- The policy was officially launched on **30 January 2023**.
- Policy can be categorized as a **feed-in-tariff policy**.

Brief objectives of the CNIS policy are as follows:

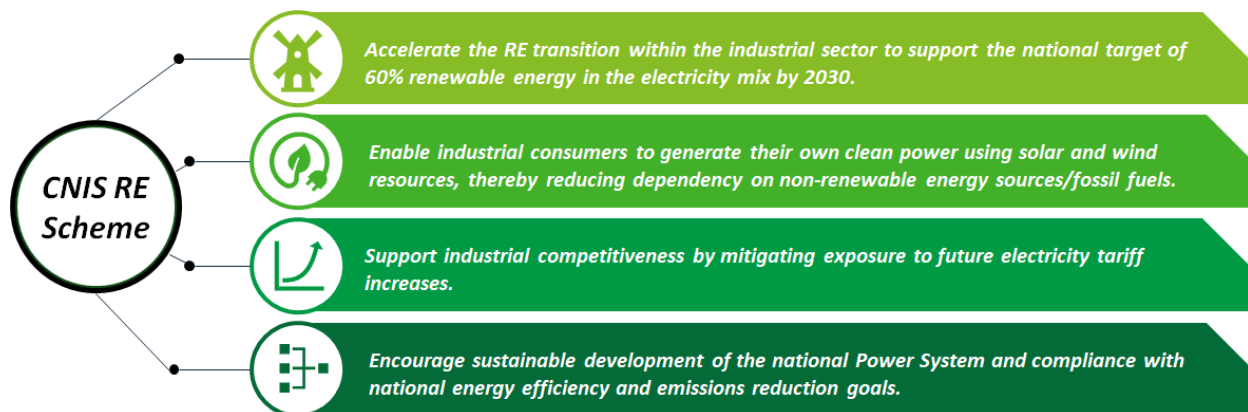


Figure 1: Brief objectives of the CNIS policy

### Policy Scope and Coverage

The CNIS RE Scheme applies to all industrial customers located in Mauritius and Rodrigues. Industrial customers **involved in sugar production or generation of energy activities are however excluded from this scheme**. The scheme provides for the installation of renewable energy facilities using **solar and wind technology**, either **on-site or off-site** based on the requirements and infrastructure of the participant.

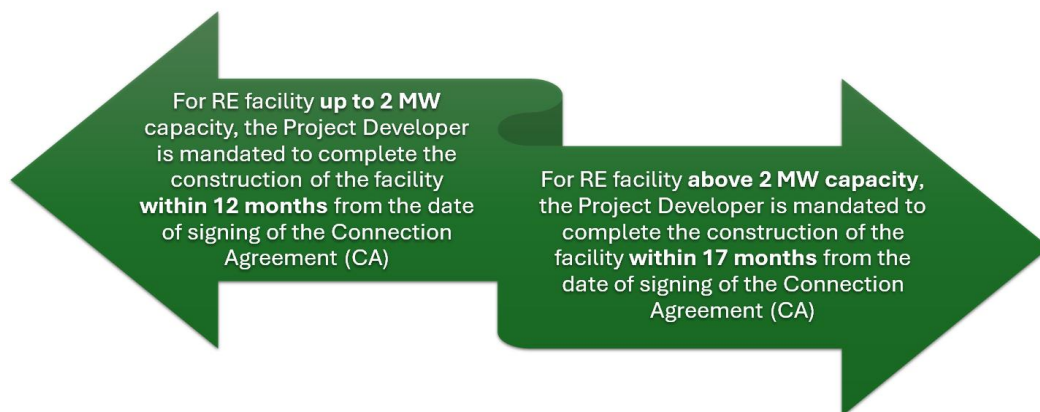
During the current phase, a cumulative total of **100 MW** has been reserved for Mauritius. However, due to increased interest, the Scheme's capacity was later expanded to 200 MW. For Rodrigues, capacity allocation will be made subject to the outcome of the *Rodrigues Île Verte* study. Each project under the Scheme has a maximum capacity limit of **15 MW (AC)**. Furthermore, post the 100 MW allocation capacity, RE projects that could not be considered will be placed in a waiting list. By June 2024, the CEB had signed agreements for a total capacity of 129 MW.

### Participation, Implementation, Compliance, and MRV Framework

As part of the CNIS Renewable Energy Scheme, an eligible industrial customer becomes a **Prosumer** and generates RE based electricity for their own use, while remaining connected to the national grid. Under the **unbundled time-of-use (ToU) tariff system**, energy produced is counterbalanced with energy imported from the grid thereby encouraging optimal energy use as well as ensuring a stable power flow. In addition, the Government introduced a waiver of 50% of the last electricity price increases for industrial customers investing in renewable energy for a maximum period of 24 months, recognising that renewable energy projects typically take 12 to 17 months to materialize<sup>4</sup>.

Participants can opt to build renewable energy facilities that can generate up to **150% of their annual electricity requirement** (based on latest monthly consumption). Selling surplus energy to the Central Electricity Board (CEB) or banking it for future use, is also an option provided to the prosumers under this scheme.

Furthermore, for the first four years of operation, the purchase for incidental excess energy is has been predetermined at a fixed rate of Mauritian Rupees or **MUR 1.86 per kWh**. After this period, excess energy can be banked, rolled over to the next billing cycle with the counter resetting to zero on 1<sup>st</sup> January every year thereafter. To ensure reliable operation and grid integration, every project considered must comply with all requirements of the relevant applicable Grid Codes. Furthermore, projects are expected to adhere to defined timelines as described below:



Before commissioning, the Prosumer is further required to a Certificate of Compliance demonstrating compliance to the applicable Grid Code, CEB’s network impact assessment’s or network survey’s recommendations as well as the Terms & Conditions (T&Cs) of the Scheme.

Furthermore, in the scheme, a systematic approach to **Monitoring, Reporting, and Verification (MRV)** of activities is provided for accountability and performance oversight. Through the CEB-managed metering system, the CNIS RE Scheme ensures that the **generation, consumption, and export of electricity** are being traced, tracked, reported, and verified accurately by CEB. Additionally, all Prosumers are provided with **production and import-export meters** by CEB, which are installed, maintained, and controlled administratively, technically and operationally by the CEB.

Where applicable, the **total monthly electricity (kWh) consumption of the prosumer** can be calculated using the following formula:

$$C = P + I - E$$

Where:

<sup>4</sup> [CEB Annual Report 2023-2024](#)

- **C** = total monthly electricity (kWh) consumption
- **P** = total energy (kWh) production by the RE facility
- **I** = total energy (kWh) imported from CEB
- **E** = total energy (kWh) exported to CEB

Prosumers are further required to provide CEB with free of charge **web-link access** to the RE facility's power output data. Additionally, CEB, as needed, may request direct access to download data from the inverter or energy management system of the facility. Prosumers are also required to provide any necessary software or applications for on-site and/or off-site data downloading to the CEB as and when needed. These measures therefore ensure accurate verification of energy flows and compliance with the scheme's rules.

## 4.2 Individual Policy Assessment of CNIS RE Scheme

As per the guidance on preliminary analysis to understand the nature of interactions of the CNIS Renewable Energy Scheme, the scheme qualifies as an **individual policy** for GHG impact assessment. The evaluation against key criteria is summarized below:

Table 3: Assessment of CNIS RE Scheme as an Individual Policy

Criterion	Questions	CNIS Assessment	Recommendation
<b>Objectives and use of results</b>	Do the end users of the assessment results want to know the impact of individual policies?	Yes. The assessment aims to quantify CO <sub>2</sub> reductions for CNIS projects.	Undertake an individual assessment.
<b>Significant interactions</b>	Are there significant (major or moderate) interactions between the CNIS RE Scheme and other policies that will be missed if assessed individually?	No. CNIS is implemented independently, with minimal overlap or reinforcement from other energy policies.	Individual policy assessment is appropriate.
<b>Scope and level of incentive</b>	Does CNIS provide a stronger incentive than other policies? Do other policies spur additional reductions not already covered?	Yes. CNIS targets industrial prosumers with dedicated capacity allocations up to 100 MW and tariffs (other RE policies have negligible overlap).	Focus assessment on CNIS as an independent policy.
<b>Feasibility</b>	Is the assessment manageable? Are data available? Are policies implemented by a single entity?	Yes. Data are available via CEB, the implementing agency, and the policy scope is well-defined.	Individual assessment is feasible.

Finally, since the policy has already been implemented, the assessment considered for this policy is **post-ante assessment**.

# Chapter 5: Identifying Impacts

To identify GHG impacts, since the CNIS Scheme involves only solar and wind power generation, **CO<sub>2</sub> can be considered as the primary GHG** to be considered for this assessment. This impact assessment does not consider other GHGs like CH<sub>4</sub> or N<sub>2</sub>O. The impacts are evaluated in a multi-dimensional manner following the ICAT Policy and Action Standard, which is briefly presented below.

Table 4: Types of GHG Impacts for the CNIS Renewable Energy Scheme

Type of GHG Impact	Description	CNIS Example
<b>Positive impact vs Negative impact</b>	Impacts that cause a decrease or increase in GHG emissions	<ul style="list-style-type: none"> <li>• <b>Positive:</b> Reduced CO<sub>2</sub> emissions from fossil fuel electricity generation displaced by CNIS RE projects</li> <li>• <b>Negative:</b> Minor CO<sub>2</sub> emissions from manufacturing and transport of solar panels and wind turbines</li> </ul>
<b>Intended impact vs Unintended impact</b>	Impacts that are both intentional and unintentional based on the original objectives of the policy	<ul style="list-style-type: none"> <li>• <b>Intended:</b> Reduced CO<sub>2</sub> emissions from fossil fuel power plants due to RE integration</li> <li>• <b>Unintended:</b> Small increase in CO<sub>2</sub> emissions associated with construction of RE facilities</li> </ul>
<b>In-jurisdiction vs Out-of-jurisdiction impact</b>	In-jurisdiction impacts occur within Mauritius; out-of-jurisdiction impacts occur outside	<ul style="list-style-type: none"> <li>• <b>In-jurisdiction:</b> Reduced CO<sub>2</sub> emissions in Mauritius from fossil fuel displacement</li> <li>• <b>Out-of-jurisdiction:</b> Not applicable (CNIS generates electricity domestically)</li> </ul>
<b>Short-term vs Long-term impact</b>	Impacts that are nearer or more distant in time	<ul style="list-style-type: none"> <li>• <b>Short-term:</b> Immediate reduction of CO<sub>2</sub> emissions from grid electricity as CNIS projects start operation</li> <li>• <b>Long-term:</b> Continued CO<sub>2</sub> reductions over the lifetime via RE facilities</li> </ul>

The table below further provides **key GHG source categories** relevant to the CNIS RE Scheme incorporating where CO<sub>2</sub> emissions are avoided or generated.

Table 5: Key GHG Source Categories for the CNIS RE Scheme

Source Category	Description	Emitting Entity or Equipment	Relevant GHGs
<b>Grid-connected electricity generation</b>	CO <sub>2</sub> emissions displaced due to the project activity	Grid-connected fossil fuel power plants supplying electricity in Mauritius	CO <sub>2</sub>
<b>Renewable energy facility construction</b>	Emissions from manufacturing, transportation, and installation of RE equipment (solar and wind)	Solar PV panels, wind turbines, inverters, etc.	CO <sub>2</sub> (minor)
<b>Renewable energy facility operation</b>	Minimal emissions during operation	Solar PV and wind facilities	CO <sub>2</sub> (minor, if any)

Furthermore, a causal chain has been developed for the policy as shown below:

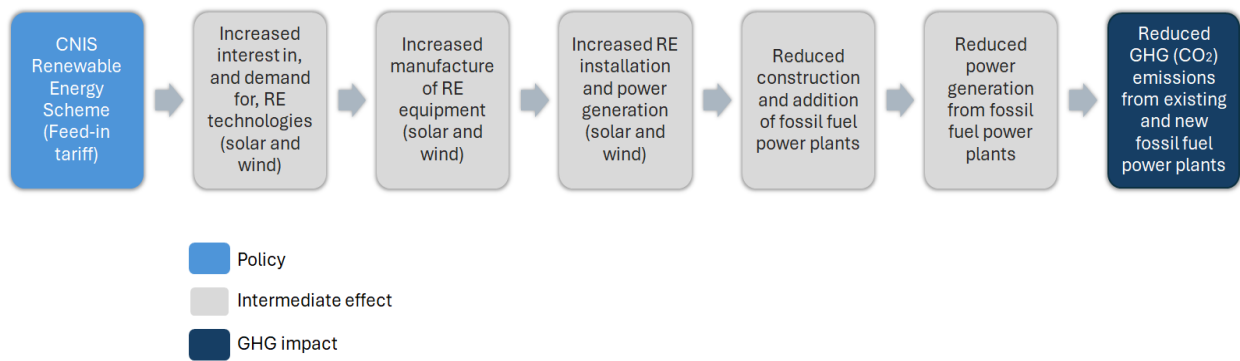


Figure 2: Causal chain for CNIS RE Scheme for Mauritius

As reflected from the chain above, for the CNIS RE Scheme, the primary GHG impacted is CO<sub>2</sub> (decrease in CO<sub>2</sub> emissions associated with fossil fuel-based electricity generation being displaced). This is because the CNIS scheme encourages the use of solar and wind installations for clean electricity production that in place directly replaces grid electricity predominantly generated using fossil fuels.

Consequently, the **assessment boundary** considered for this GHG impact assessment studies solely the **CO<sub>2</sub> emissions due to electricity generation from fossil fuels replaced by renewable energy production.**

Table 6: GHG Impacts, And Source Categories Included/Excluded in The GHG Assessment Boundary For CNIS RE Scheme

GHG Impact	Relevant GHGs	Likelihood	Relative Magnitude	Included /Excluded	Justification / Explanation
<b>Reduced GHG emissions from existing and new fossil fuel power plants</b>	CO <sub>2</sub>	Very likely	Major	<b>Included</b>	CO <sub>2</sub> is the <b>primary and most significant GHG impact</b> of CNIS RE Scheme, resulting due to electricity generation from fossil fuels replaced by RE production.
<b>Reduced emissions from mining of fossil fuels</b>	CH <sub>4</sub>	Possible	Minor	Excluded	Less consumption of fossil fuel while slightly reduces mining activity, however, the impact is very small compared to the final power sector emissions.
<b>Increased emissions from manufacturing of RE equipment</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Possible	Minor	Excluded	Considered insignificant and is often offset by decreased emissions from construction of fossil fuel power plants
<b>Reduced emissions from construction of fossil fuel power plants</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Possible	Minor	Excluded	Considered insignificant and is often offset by increased emissions from construction of RE power plants
<b>Leakage emissions to</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Unlikely	-	Excluded	The scheme is applicable within Mauritius and does not directly

GHG Impact	Relevant GHGs	Likelihood	Relative Magnitude	Included /Excluded	Justification / Explanation
<b>other jurisdictions</b>					affect other jurisdictions
<b>Reduced emissions from lower energy use due to increased cost of electricity</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Unlikely	-	Excluded	CNIS incentives do not increase electricity prices, therefore excluded
<b>For geothermal power plants, fugitive emissions of CH<sub>4</sub> and CO<sub>2</sub></b>	CH <sub>4</sub> , CO <sub>2</sub>	Unlikely	-	Excluded	The CNIS Scheme does not include geothermal energy projects
<b>For hydropower plants, emissions of CH<sub>4</sub> and CO<sub>2</sub> from water reservoirs</b>	CO <sub>2</sub> , CH <sub>4</sub>	Unlikely	-	Excluded	The CNIS Scheme does not include hydropower projects
<b>For biomass power plants, emissions associated with agriculture and land-use change</b>	CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O	Unlikely	-	Excluded	The CNIS Scheme does not include biomass projects

**The assessment period considered for this scheme is 2023-24.**

# Chapter 6: Estimating GHG Impacts of the Policy Ex-Post

In order to estimate the GHG impacts of the CNIS Renewable Energy Scheme, the ICAT renewable energy methodology provides us with the option of choosing between two methods for translating estimated RE addition into GHG impacts: **the emissions trajectory method and the grid emission factor method.**

The grid emission factor approach assumes that RE generated under the CNIS Scheme, substitutes electricity independently supplied from the grid in the existing grid and calculates GHG impacts accordingly. This approach is applicable for policies that results in limited impact on grid mixes. The approach assumes that the RE generated from CNIS projects replaces carbon intense patterns of electricity generation and, to some extent, avoids adding fossil fuel capacity.

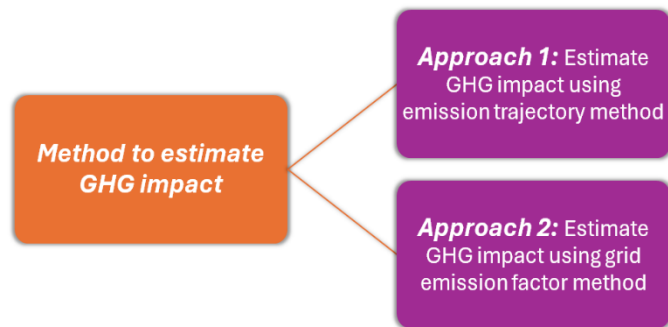


Figure 3: Approaches available for GHG impact estimation as per ICAT renewable energy methodology

As per expert consultation and literature review, the parameters provided for CNIS Scheme are as follows:

- By June 2024, the CEB signed agreements for a total capacity of 129 MW<sup>5</sup>.
- Expert consultations confirmed the whole new contracted capacity by end 2025 was 153 MW.
- Renewable energy projects typically take 12 to 17 months to materialize

The annual average Tier 3 Grid Emission Factor for Mauritius is **0.7521 tCO<sub>2</sub> per MWh** including electricity generated from renewable sources. Electricity generation data from every installation implemented through CNIS was not available. It was therefore necessary to make assumptions on electricity generation based on assumptions on electricity generation. For this, the data calculations provided by GACMO were used. Chapter 6 and Annexex provide a detailed description of the method and data used to calculate the assumed electricity generation.

**The equation used to calculate the estimate ex-post GHG impact (via grid emission factor method) is as follows:**

$$\text{Estimated GHG impacts} = \text{Updated GEF} \times \text{RE electricity generation}$$

Where the unit types for each parameter are as follows:

- Updated GEF = Updated Grid Emission Factor
  - Considered **0.7521 tCO<sub>2</sub> per MWh** as per expert consultation
- RE addition: electricity generation from renewable sources realized via the policy ex-post until 2025 and ex-ante, to be implemented from 2026, until reaching 153 MW capacity generation potential.

<sup>5</sup> [CEB Annual Report 2023/2024](#)

Following the above equation, the steps undertaken to calculate ex-post GHG impact (via grid emission factor method) included making assumptions on the electricity generated through CNIS implemented installations. Information gathered for the GACMO assessment provided data on capacity installed through CNIS (See Table 8). As CNIS was launched in 2023 and renewable energy projects typically take 12 to 17 months to materialize, no CNIS attributable electricity generation was assumed for 2023. CNIS installations implemented by 2025 amount to 61.73 MW. As no differentiation between implementation in 2024 and 2025 was available, the analysis assumed the full 61.73 MW were implemented in 2024. In addition, a total of 153 MW were already contracted in 2025, providing an expectation of implementation during 2026.

*Table 7: Installed capacity and related electricity generation and emission reductions attributable to CNIS*

Year	2023	2024	2025	2026
<b>Accumulated installed capacity through CNIS (MW)</b>	0	61.73	61.73	153.01
<b>Electricity generation GWh</b>	0	90.60	90.60	224.58
<b>Annual mission reductions tCO<sub>2</sub>e</b>	0	68,142.4	68,142.4	168,904.2
<b>Cumulative emission reduction</b>	0	68,142.4	136,284.8	305,189.1

The analysis shows that the expected annual emission reductions for CNIS amount to 68,142 tCO<sub>2</sub>e ex-post, with cumulative emission reductions amounting to 136,285 tCO<sub>2</sub>e from the start of CNIS implementation in 2023 until end 2025. In addition, as data was available on contracted new additions, it was possible to establish annual emission reduction in 2026 from CNIS to 168,904 tCO<sub>2</sub>e, and cumulative emissions for the full duration of CNIS to 305,189 tCO<sub>2</sub>e for the period 2023-2026.

# Chapter 6: Results of GACMO assessment and differences

The GACMO (Greenhouse Gas Abatement Cost Model) is a greenhouse gas emissions projections tool developed over more than twenty years by the UNEP Copenhagen Climate Centre. It has been developed to assist countries in carrying out scenario analysis of how a variety of mitigation options impact emissions. The tool includes seven technical sheets: Assumptions, Energy Balance, GHG Balance, Growth, BAU projected Energy Balances, BAU projected GHG Balances, and Mitigation Options. The needed input to establish the BAU and mitigation scenarios are provided here. The next sheet Results includes all the results and graphics resulting from the application of the GACMO tool run by the user. As the focus of the analysis was to analyse the impact of a specific policy, the assessment did not take an economy wide GHG assessment approach, which is otherwise enabled through the tool.

The GACMO Analysis considered the start year of implementation to be 2023 and end year to be 2026, as per information provided by CEB. The expected new renewable energy capacity installation was assumed to be 100 MW, but the analysis took note that the whole new contracted capacity of 153 MW was modelled, as per information provided by CEB. As a breakdown of new installation by size was not given, it was assumed that the size shares of new installations for the remaining capacity to be installed was consistent with the shares of installed capacity during the first two years of the measure (see table). In addition, data was also provided on investment costs and electricity prices, which enabled the analysis to estimate expected energy savings throughout the lifetime of the investment and generate Marginal Abatement Revenue Curves.

The GACMO model includes technology sheets with data inputs for each mitigation measure, which can be customized according to the specific envisioned mitigation measures. An overview of the technology sheets for the mitigation measures envisioned by the policy, as inputted into GACMO can be found in the **Error! Reference source not found.**

Table 8: Installed capacity and expected capacity to be installed by 2026 in MW

		CEB 22-23	Aug-25	Installed in 23-25 through CNIS	To be installed by 2026
		Capacity MW	Capacity MW	Capacity MW	Capacity MW
<b>SSDG<sup>6</sup></b>	<50kw	12.84	28.61	15.77	23.32
<b>MSDG<sup>7</sup></b>	50kw<x<2MW	10.26	26.53	16.27	24.06
<b>LSDG<sup>8</sup></b>	>2MW	91.02	120.71	29.69	43.90
<b>Wind</b>		9.35	9.35	0	0
		123.47	185.2	61.73	91.28

The CEB provided a capacity/utilization factor for 15-17%. To reflect this value, the GACMO input data “daily insolation” and “efficiency factor” were manually forced in the GACMO mitigation measure sheet. For future customization of the GACMO model to Mauritius, the modelling of such measure

<sup>6</sup> SSDG= Small-scale Distributed Generation Solar PV installations with an average of 5 kW capacity

<sup>7</sup> MSDG= Medium-scale Distributed Generation Solar PV installation with an average of 500 kW capacity

<sup>8</sup> LSDG= Large-scale Distributed Generation Solar PV installation with an average of 2 MW capacity

can be substituted with the variable “energy specific output kWh/kWp”, which represent the specific output of a power plant over a year and is, in general, the most common indicator for a PV power plant.

An additional analysis was also made to assess potential future developments in the energy system in the future, by progressively reducing the electricity price and the grid emission factors for the future time intervals of 2030, 2040 and 2050 tables, but as the main scope of the assessment was to assess the ex-post impact of the policy, this scenario was not included in the analysis. Nevertheless, the presented analysis, still presents some results related to ex-ante estimations of implementation during 2026 to include potential GHG impacts for the full duration of the policy. Therefore, two of the 5-year time intervals provided by GACMO have been included in the analysis, 2025 and 2030. The estimated annual emission reductions by the CNIS policy amount to 68,142.4 tCO<sub>2</sub>e by 2025, with an expected sharp increase during 2026, amounting to 100,761.8 tCO<sub>2</sub>e, as contracted capacity additions come online and go from contracting to actual operation.

The actual installation from 2023 to 2025 has been for a total of 61.73 MW, with an additional 91.27 MW to be installed after 2025 for a total of 153 MW. Assumed annual electricity generation from these installations amount to 224.58 GWh, corresponding to 168.86 tCO<sub>2</sub>e in annual emission reductions by 2026, when applying the updated grid emission factor of 0.7521 tCO<sub>2</sub>/MWh.

Table 9: Overview of past and planned CNIS installations, investments, energy generation and emission reductions

Installation type	Installed during 2023-2025 MWp	Annual Electricity generated 2023-2025 GWh	Annual emission reductions 2023-2025 ktCO <sub>2</sub> e	Investments (Million USD)	To be installed MWp in 2026	Annual Electricity generation from 2026 installations GWh	Annual emission reductions from 2026 installations ktCO <sub>2</sub> e	Investments (Million USD)
<b>SSDG</b>	15.77	20.15	15.15	19.43	23.32	29.79	22.41	25.86
<b>MSDG</b>	16.27	24.94	18.76	17.18	24.06	36.88	27.74	22.87
<b>LSDG</b>	29.69	45.51	34.23	26.13	43.90	67.30	50.62	34.77
<b>Totals</b>	<b>61.73</b>	<b>90.60</b>	<b>68.14</b>	<b>62.74</b>	<b>91.28</b>	<b>133.97</b>	<b>100.76</b>	<b>83.49</b>

## 6.1 Marginal Abatement Revenue Curves

GACMO automatically generates MARC based on the data provided corresponding to an inverted marginal abatement costs curve. The MARC is calculated based on the cost (investment and operational costs) of a mitigation option for reducing one unit of greenhouse gas emission – in US\$/tCO<sub>2</sub> equivalent - (y-axis), and on the total greenhouse gas emission reduction achieved by the same mitigation option per year – in ktCO<sub>2</sub> equivalent/year - (x-axis). For each mitigation option, the MARC provides a graphical representation of the reduction potential of the option versus its cost. By integrating all the relevant mitigation options, the MARC compares the potential reductions among all the options versus their costs. Therefore, the MARC enables the identification of mitigation options that come at incremental costs or revenues compared to the baseline.

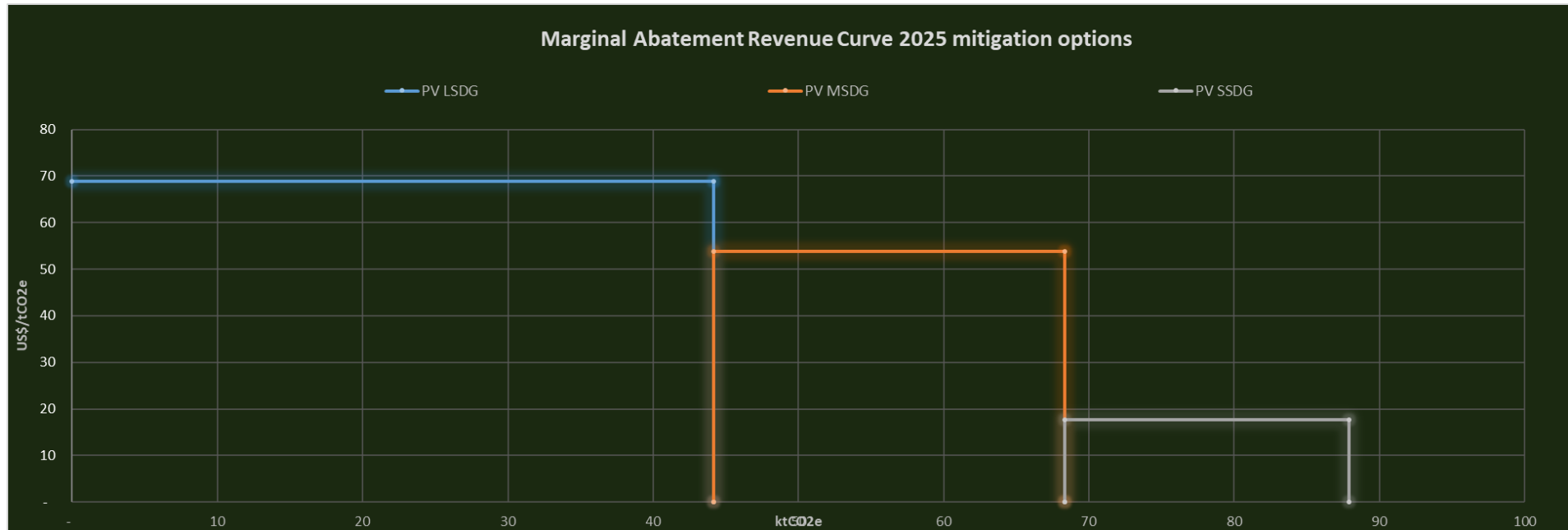
The total related investments are estimated at approximately 140 M USD by 2030 (see Table 9). Average cost of PV installation based on information provided by CEB, at 40,000 Rs/kWp (880 \$/kWp). Despite this number being provided by initial remote consultations with CEB, during the workshop different and much higher figures were suggested by the participants. Also, there is no differentiation of prices between the different size categories represented in the model. For the sake of differentiating the three sizes, an increase in installation price of 20% with respect to LSDG was considered for MSDG, and 40% for LSDG. These data should be adjusted by the country when better

data is available. Annual O&M costs are assumed at approximately 1% of installation costs.

According to the analysis, all the solar PV additions are “win-win” options, irrespective of their different sizes and assumed changes in installation costs. As can be seen by the MARC and Table 10, the largest GHG emission reduction potential can be found in the installation of Large-scale Distributed Generation Solar PV installations, followed by medium- and small-sized installations. The cost efficiency of the measures also follows the same trend.



Table 10: Marginal Abatement Revenue Curve for the CNIS Related Mitigation Measures



## 6.2 Interlinkages and complementarity between the ICAT Policy Assessment and GACMO Assessment

The results of the ICAT Policy Assessment and GACMO assessment are aligned, as the calculations on electricity generation from CNIS attributable installations was done using GACMO, and its results forming the basis for the application of the emission factor method in the ICAT Assessment, the same method embedded in the calculation formulas in GACMO. The data received on implementation intervals was also the same, and even though GACMO is designed to calculate implementation of mitigation measures and related emission reductions in 5-year intervals, these fit well with the time intervals of the ICAT policy assessment.

The analysis of both ICAT Policy and GACMO illustrates how these two tools complement each other. Given the lack of data on actual electricity generation attributable to CNIS installations, the ICAT Policy Assessment could not have been performed without making a range of assumptions on electricity generation from the renewable energy additions through CNIS. The GACMO tool provided in this case a valuable tool to make calculations on electricity generation based on a mix of local and general parameters related to solar PV generation.

# Chapter 7: Monitoring Performance Over Time

To facilitate effective ex-post estimation of GHG impacts under the CNIS policy, a limited array of Key Performance Indicators (KPIs) has been defined for monitoring overtime. These KPIs were chosen based on their immediate relationship to meeting the CNIS objectives, usefulness to evaluating policy performance, and the availability and reliability of underlying data. Using the following proposed KPIs, implementing agency can assess whether activities supported the policy are within planned progress or should require corrective measures or action. The list of KPIs are as follows:

Table 11: Key Performance Indicators for CNIS Renewable Energy Scheme

Key Performance Indicator	Definition	CNIS-Specific Examples
<b>Inputs</b>	Resources that go into implementing the CNIS policy	<ul style="list-style-type: none"> <li>• Annual budget allocated for CNIS implementation and administration</li> <li>• Concessional financing/grant support mobilized through CNIS</li> <li>• Human resources assigned for CNIS project implementation and MRV</li> </ul>
<b>Activities</b>	Administrative and operational activities involved in implementing the CNIS policy	<ul style="list-style-type: none"> <li>• Number of CNIS applications received and processed</li> </ul>
<b>Intermediate Effects</b>	Changes in behaviour, technology uptake, processes or practices resulting from CNIS implementation	<ul style="list-style-type: none"> <li>• Increase in RE project proposals in targeted technologies/sectors</li> <li>• Installed RE capacity and related electricity generation</li> <li>• Number of prosumers shifting to cleaner technologies due to improved financing conditions</li> </ul>
<b>Sustainable Development Impacts</b>	Changes in relevant environmental, social or economic conditions that result from the CNIS policy	<ul style="list-style-type: none"> <li>• GHG emissions avoided</li> <li>• Reduction in project development cost due to CNIS support</li> <li>• Number of jobs created</li> <li>• Households or enterprises benefiting from reduced energy costs</li> <li>• Improvement in local air quality attributable to increased renewable energy penetration</li> </ul>

The specified data sources used to track each of the indicators on the list include project-level reporting (from developers), DISCOM energy accounting systems, CNIS administrative records, CNIS progress reports, financial disbursement documentation, and independent verification audits, and so on. The monitoring frequency may vary by KPIs, e.g., operational information can be collected monthly or quarterly (e.g. energy generation), while broader socio-economic or financial indicators can be captured annually. This comprehensive data collection framework provides for consistency, transparency and accuracy when tracking CNIS performance over time in addition to providing the necessary data inputs for ex-post GHG impact assessment in near future.

# Annexure

To facilitate effective ex-post estimation, an expert stakeholder discussion was conducted with representatives from Central Electricity Board (CEB) Mauritius, and data was requested on parameters required for the ex-post calculation. The data received from CEB is as follows:

- The annual average Tier 3 Grid Emission Factor for Mauritius is **0.7521 tCO<sub>2</sub> per MWh** including electricity generated from renewable sources.
- For the year ending 2024, the total net electricity supplied to grid from RE was **503.64 GWh**

## Mitigation Measure data input to GACMO

Table 12: GACMO Data Entry for Large-scale Distributed Generation Solar PV installation with an average of 2 MW capacity

LSDG PV, 2 MW - 2025				
Costs in US\$	Reduction Option	Reference Option	Increase (Red.-Ref.)	
Total investment	1,760,000		1,760,000	
Project life	20			
Lev. investment	206,729		206,729	
Annual O&M	17,600		17,600	
Annual fuelcost		429,240	- 429,240	
Total annual cost	224,329	429,240	- <b>204,911</b>	
Annual emissions (tons)	Tons	Tons	Reduction	
Fuel CO <sub>2</sub> -eq. emission		2,974	2,974	
Other				
Total CO <sub>2</sub> -eq. emission	-	2,974	<b>2,974</b>	
<b>US\$/ton CO<sub>2</sub>-eq.</b>			<b>-68.9</b>	
<b>General inputs:</b> Discount rate: 10% Reference electricity price: 0.14 US\$/kWh CO <sub>2</sub> -eq. emission coefficient: 0.97 tCO <sub>2</sub> /MWh <b>Activity: Solar PV</b> Size of solar PV: 2.0 MW Investment in Activity: 880 US\$/kW Daily insolation: 6 hours Annual capacity factor: 2190 Full time hours Efficiency factor: 0.7 O&M: 1.0% Of investment Electricity production: 3066 MWh Cost of electricity produced: 0.073 US\$/kWh <b>Reference option: No solar PVs</b> Electricity production: 3066 MWh				
<b>Notes:</b> The daily insolation was set to an average of 6 hours per day and the efficiency to 0.7 to align with the given data of 17% capacity utilization factor. Data should be adjusted to reflect the real average of LSDG plants, and an average annual production per kWp can also be inserted				

Table 13: GACMO Data Entry for MSDG= Medium-scale Distributed Generation Solar PV installation with an average of 500 kW capacity

MSDG PV, 500 kW - 2025				
Costs in US\$	Reduction Option	Reference Option	Increase (Red.-Ref.)	
Total investment	528,000		528,000	
Project life	20			
Lev. investment	62,019		62,018.7	
Annual O&M	5,280		5,280.0	
Annual fuelcost		107,310	- 107,310	
Total annual cost	67,299	107,310	- 40,011	
Annual emissions (tons)	Tons	Tons	Reduction	
Fuel CO2-eq. emission		744	744	
Other				
Total CO2-eq. emission	-	744	744	
<b>US\$/ton CO2-eq.</b>				<b>-53.8</b>
<b>General inputs:</b>				
Discount rate		10%		
Reference electricity price		0.14	US\$/kWh	
CO2-eq. emission coefficient		0.97	tCO2/MWh	
<b>Activity: Solar PV</b>				
Size of solar PV		500.0	kW	
Investment in Activity		1056	US\$/kW	
Daily insolation		6	hours	
Annual capacity factor		2190	Full time hours	
Efficiency factor		0.7		
O&M		1.0%	Of investment	
Electricity production		766.500	MWh	
Cost of electricity produced		0.088	US\$/kWh	
<b>Reference option: No solar PVs</b>				
Electricity production		766.500	MWh	

**Notes:**  
 The daily insolation was set to and average of 6 hours per day and the efficiency to 0.7 to align with the given data of 17% capacity utilization factor . Data should be adjusted to reflect the real average of LSDG plants, and an average annual production per kWp can also be inserted. Also, estimation for grid emission factor, cost of investment and cost of electricity should be made for each time horizon

Table 14: GACMO Data Entry for Small-scale Distributed Generation Solar PV installation with an average of 2 MW capacity

SSDG PV, 5 kW - 2025				
Costs in US\$	Reduction Option	Reference Option	Increase (Red.-Ref.)	
Total investment	6,160		6,160	
Project life	20			
Lev. investment	724		723.6	
Annual O&M	62		61.6	
Annual fuelcost		894	- 894.3	
Total annual cost	785	894	- 109.1	
Annual emissions (tons)	Tons	Tons	Reduction	
Fuel CO2-eq. emission		6	6	
Other				
Total CO2-eq. emission	-	6	6	
<b>US\$/ton CO2-eq.</b>				<b>-17.6</b>
<b>General inputs:</b>				
Discount rate		10%		
Reference electricity price		0.14	US\$/kWh	
CO2-eq. emission coefficient		0.97	tCO2/MWh	
<b>Activity: Solar PV</b>				
Size of solar PV		5.000	kW	
Investment in Activity		1232	US\$/kW	
Daily insolation		5	hours	
Annual capacity factor		1825	Full time hours	
Efficiency factor		0.7		
O&M		1.0%	Of investment	
Electricity production		6.388	MWh	
Cost of electricity produced		0.123	US\$/kWh	
<b>Reference option: No solar PVs</b>				
Electricity production		6.388	MWh	

The daily insolation was set to and average of 6 hours per day and the efficiency to 0.7 to align with the given data of 17% capacity utilization factor . Data should be adjusted to reflect the real average of LSDG plants, and an average annual production per kWp can also be inserted. Also, estimation for grid emission factor, cost of investment and cost of electricity should be made for each time horizon