PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 4.9MWp solar project by Avatar Solar Energy Pvt. Ltd in Gujarat

Version 1.0
Date 02/07/2024
First CoU Issuance Period: 07 years,00 months
Date: 31/03/2013 to 30/03/2020

Project Concept Note (PCN)
CARBON OFFSET UNIT (CoU) PROJECT

BASIC INFORMATION	
Title of the project activity	4.9MWp solar project by Avatar Solar Energy Pvt. Ltd in Gujarat
Scale of the project activity	Small scale
Completion date of the PCN	02/07/2024
Project participants	Avatar Solar Energy Pvt. Ltd
Host Party	India
Applied methodologies and standardized baselines	AMS.I.D Grid connected renewable electricity generation version 18 Grid connected renewable electricity generation version 18
Sectoral scopes	SELECT SCOPE 01 Energy industries (Renewable/NonRenewable Sources)
Estimated amount of total GHG emission reductions	49,970 CoUs (49,970 tCO2eq)

Project Concept Note (PCN)
CARBON OFFSET UNIT (CoU) PROJECT

BASIC INFORMATION	
Title of the project activity	4.9MWp solar project by Avatar Solar Energy Pvt. Ltd in Gujarat
Scale of the project activity	Small scale
Completion date of the PCN	02/07/2024
Project participants	Avatar Solar Energy Pvt. Ltd
Host Party	India
Applied methodologies and standardized baselines	AMS.I.D Grid connected renewable electricity generation version 18 Grid connected renewable electricity generation version 18
Sectoral scopes	SELECT SCOPE 01 Energy industries (Renewable/NonRenewable Sources)
Estimated amount of total GHG emission reductions	49,970 CoUs (49,970 tCO2eq)

SECTION A. Description of project activity

A.1. Purpose and general description of Carbon offset Unit (CoU) project activity >>

The project 4.9MWp (DC) solar project by Avatar Solar Energy Pvt. Ltd in Gujarat is located in Village Charanka, Tehsil Santalpur, District Patan, State Gujarat, Country India.

The details of the registered project are as follows:

Purpose of the project activity:

The project "4.9 MW DC Solar Power Project in Gujarat" is located in Village Charanka Tehsil Santalpur, District Patan, State Gujarat, and Country India.

The details of the registered project are as follows:

Purpose of the project activity:

The main purpose of the project activity is the implementation and operation of 4.9 MW DC solar power plant to generate electricity. M/s Avatar Solar Energy Pvt. Ltd is the promoter of this Solar power plant. The generated electricity from solar power plant is connected to state electric utility namely GUJARAT URJA VIKAS NIGAM LIMITED (GUVNL) and transmitted through state electric grid.
The project implementation schedule is placed below:

Capacity	Project owner	Location	Latitude (N)	Longitude (E)	Date of commissioning
4.9 MW (DC)	Avatar Solar Energy Pvt. Ltd.	Village Charanka, Santalpur, District Patan State Gujarat	23.9165 N	71.1895 E	31/March/2013

The project replaces anthropogenic emissions of greenhouse gases (GHGs) estimated to be approximately 7,139 tCO_2e per annum there on displacing 7,932 MWh/ year amount of electricity from the generation mix of power plants connected to the Indian electricity grid, which is mainly dominated by the thermal / fossil fuel-based power plant.
Monthly reading is taken from the meter at substation by state utility and representative of PP. This reading gives the net electricity exported to the grid connected to the substation (132KV substation Campus, Gotri, Vadodara 390021).
The project activity is the installation of a new grid connected renewable power plant/unit. The scenario existing prior to the implementation of the project activity is 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. Baseline scenario and scenario existing prior to the implementation of the project activity are both same.

A.2 Do no harm or Impact test of the project activity>>

There are social, environmental, economic and technological benefits which contribute to sustainable development.

- **Social benefits:**

- Social well being is assessed by contribution by the project activity towards improvement in living standards of the local community.
- The project activity has resulted in increased job opportunities for the local population on temporary and permanent basis.
- Manpower was required both during erection and operation of the solar farms. This has resulted in poverty alleviation of the local community and development of basic infrastructure leading to improvement in living standards of the local population.

- **Environmental benefits:**
- The project utilizes solar energy for generating electricity which otherwise would have been generated through alternate fuel (most likely - fossil fuel) based power plants, contributing to reduction in specific emissions (emissions of pollutant/unit of energy generated) including GHG emissions.
- As solar power projects produce no end products in the form of solid waste (ash etc.), they address the problem of solid waste disposal encountered by most other sources of power.
- Being a renewable resource, using solar energy to generate electricity contributes to resource conservation. Thus, the project causes no negative impact on the surrounding environment.

- **Economic benefits:**
- There is continuous research and development on the geometry of the solar blades, height of towers, diameters of towers, etc., which augurs well for the technological well being in the development of solar energy to produce clean electricity.
- The generated electricity from the project activity is connected to the grid. The project activity improves the supply of electricity with clean, renewable solar power while contributing to the regional/local economic development.
- Solar energy plants provide local distributed generation, and provide site-specific reliability and transmission and distribution benefits including:
    - improved power quality
    - Reactive power control
    - Mitigation of transmission and distribution congestion

A.3. Location of project activity >>

Country: India
District: Patan
Village: Charanka
Tehsil: Santalpur
State: Gujarat
Code: 384265

A.4. Technologies/measures >>

Describe in detail - The project activity involves setting up of Solar PV project of 4.9 MW (DC) to harness the power of sun to produce electricity and supply for captive consumption. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants.

The Solar PV modules are make by Waaree & IDK in association with its collaborators using state of the art technology.

The important parts of a Solar power plant are:

1. Solar Panels (Photovoltaic Cells):

- The core component of a solar power plant is the solar panels, which consist of photovoltaic cells.
- Photovoltaic cells convert sunlight directly into electricity through the photovoltaic effect.

2. Mounting Structures:

- Solar panels are mounted on robust structures designed to withstand environmental conditions and ensure optimal positioning for sunlight exposure.
- These structures can be fixed, adjustable, or tracking systems to maximize energy capture throughout the day.

3. Inverter Systems:

- The direct current (DC) electricity generated by the solar panels is converted into alternating current (AC) electricity using inverters.
- Inverters also monitor and control the performance of the solar panels to optimize energy production.

4. Grid Connection:

- The solar power plant is connected to the electrical grid to supply electricity to consumers.
- Grid connection involves synchronization and coordination with existing power infrastructure to ensure seamless integration.

5. Process Flow:

- Solar panels absorb sunlight and convert it into electricity.
- The generated electricity is transmitted to inverters, where it is converted from DC to AC.
- Inverters regulate the electricity output and feed it into the power conditioning units.
- Power conditioning units ensure the quality and compatibility of electricity for grid connection.
- The electricity is then fed into the grid for distribution to consumers.

The technical specifications of the key components that are used for baseline calculations or methodology selection limits as given below:

Specification	Make	Value
PV modules	Idk	15504
PV modules	Waaree	6240
Invertors	630 KW abb	7
Compact secondary substation	Universal 1500 kva	3
Compact secondary substation	Universal 750 kva	1
String monitoring box	L&T	42
Power Transformer	5/6 mVA	1

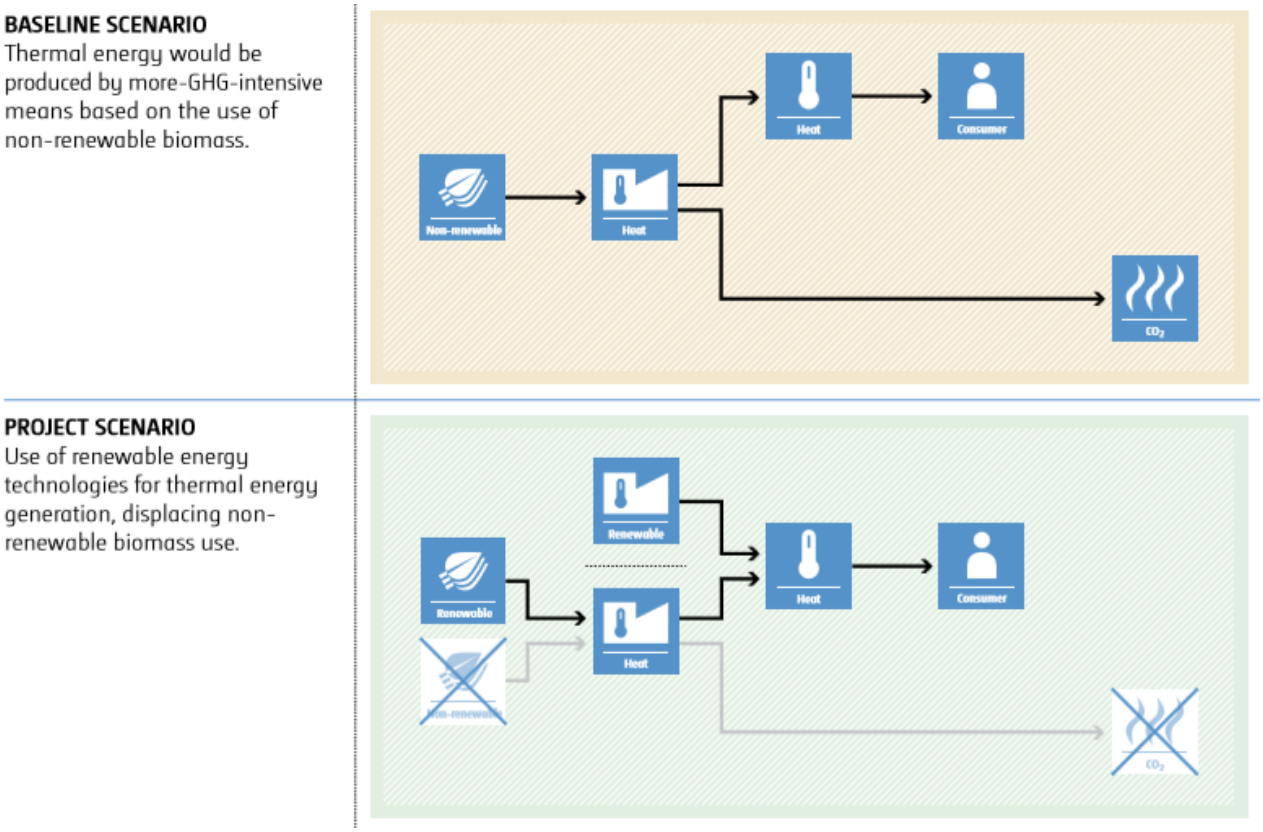
A.5. Parties and project participants >>

Party (Host)	Participants
India	Avatar Solar Energy Pvt. Ltd.

A.6. Baseline Emissions>>

The baseline scenario identified at the PCN stage of the project activity is:

- In the absence of the project activity, the equivalent amount of electricity would have been imported from the regional grid (which is connected to the unified Indian Grid, which is carbon intensive due to predominantly sourced from fossil fuel-based power plants. Hence, baseline scenario of the project activity is the grid-based electricity system, which is also the pre project scenario.



A.7. Debundling>>

This 4.9MWp (DC) solar project by Avatar Solar Energy Pvt. Ltd in Gujarat project is not a debundled component of a larger project activity. Hence de-bundling is not applicable for this project activity.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines >>

SECTORAL SCOPE – 01 Energy industries (Renewable/Non-renewable sources)

TYPE I - Renewable Energy Projects

CATEGORY – AMS I D -Grid connected renewable electricity generation version 18[1]

B.2. Applicability of methodologies and standardized baselines >>

The project activity involves generation of grid connected electricity from the construction and operation of a new solar power project for supply to grid. The project activity has installed capacity of 4.9 MW (DC) which qualifies for a small-scale project activity. The project status is corresponding to the methodology AMS I D Grid connected renewable electricity generation version 18 and applicability of methodology is discussed below:

Applicability Criterion		**Project Case**		
This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, solar, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid. (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.		The project activity is a Renewable Energy Project i.e., Solar Power Project which falls under applicability criteria option 1(b) i.e., "Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling". Hence the project activity meets the given applicability criterion.		
2 Illustration of respective situations under which each of the methodology (i.e. "AMS-I.D.: Grid connected renewable electricity generation", applies is included in the appendix.		AMS I.D. Version 18[2], EB 61 is applicable (please refer footnote).		
	Project type	AMS-I. A	AMS-I. D	AMS-I. F
1	Project supplies electricity to a national/regional grid		√	
2	Project displaces grid electricity consumption (e.g., grid import) and/or captive fossil fuel electricity generation at the user end (excess electricity may be supplied to a grid)			√

[1] https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC
[2] https://cdm.unfccc.int/UserManagement/FileStorage/2P7FS6ZQAR84LG3NMKYUH50WI9ODBC

3	Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)		√	
4	Project supplies electricity to a mini grid system where in the baseline all generators use exclusively fuel oil and/or diesel fuel			√
5	Project supplies electricity to household users (included in the project boundary) located in off grid areas	√		

plant(s); or (d) involve a replacement[3] of (an) existing plant(s).	
Hydro power plants with reservoirs[4] that satisfy at least one of the following conditions are eligible to apply this methodology: • The project activity is implemented in an existing reservoir with no change in the volume of reservoir; • The project activity is implemented in an existing reservoir5, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m2; • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	The project is solar power project and thus the criterion is not applicable to this project activity.
5. If the new unit has both renewable and non-renewable components (e.g., a solar/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel6, the	The project activity is a 4.9 MW (DC) solar electricity generation. Unit does not co-fire fossil fuels. Hence the criterion is not applicable to the project activity.

[3] Replacement. It involves investment in a new power plant or unit that replaces one or several existing unit(s) at the existing power plant. The installed capacity of the new plant or unit is equal to or higher than the plant or unit that was replaced

[4] A reservoir is a water body created in valleys to store water generally made by the construction of a dam.

[5] A reservoir is to be considered as an "existing reservoir" if it has been in operation for at least three years before the implementation of the project activity

[6] A co-fired system uses both fossil and renewable fuels, for example the simultaneous combustion of both biomass residues and fossil fuels in a single boiler. Fossil fuel may be used during a period of time when the biomass is not available and due justifications are provided.

capacity of the entire unit shall not exceed the limit of 15 MW.	
6. Combined heat and power (co-generation) systems are not eligible under this category.	The Project activity is a renewable solar energy project and is not a combined heat and power system. Hence the criteria is not applicable to the project activity
7. In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct7 from the existing units.	The project activity is Greenfield and there is no existing power generation facility at the site. Hence the criteria is not applicable to the project activity
8. In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	Not applicable, the solar project is a Green field project activity and this project is not the enhancement or up gradation project.
9. In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored.	The Project activity is a renewable solar power project and is not a landfill gas, waste gas, waste water treatment and agro-industries projects or recovered methane emissions project. Hence the criteria is not applicable to the project activity
10. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The Project activity is a renewable solar power project and is not a biomass project. Hence the criteria is not applicable to the project activity.

B.3. Applicability of double counting emission reductions >>

PP will request for issuance of carbon offsets in UCR for the post completion of the fixed crediting

[7] Physically distinct units are those that are capable of generating electricity without the operation of existing units, and that do not directly affect the mechanical, thermal, or electrical characteristics of the existing facility. For example, the addition of a steam turbine to an existing combustion turbine to create a combined cycle unit would not be considered "physically distinct".

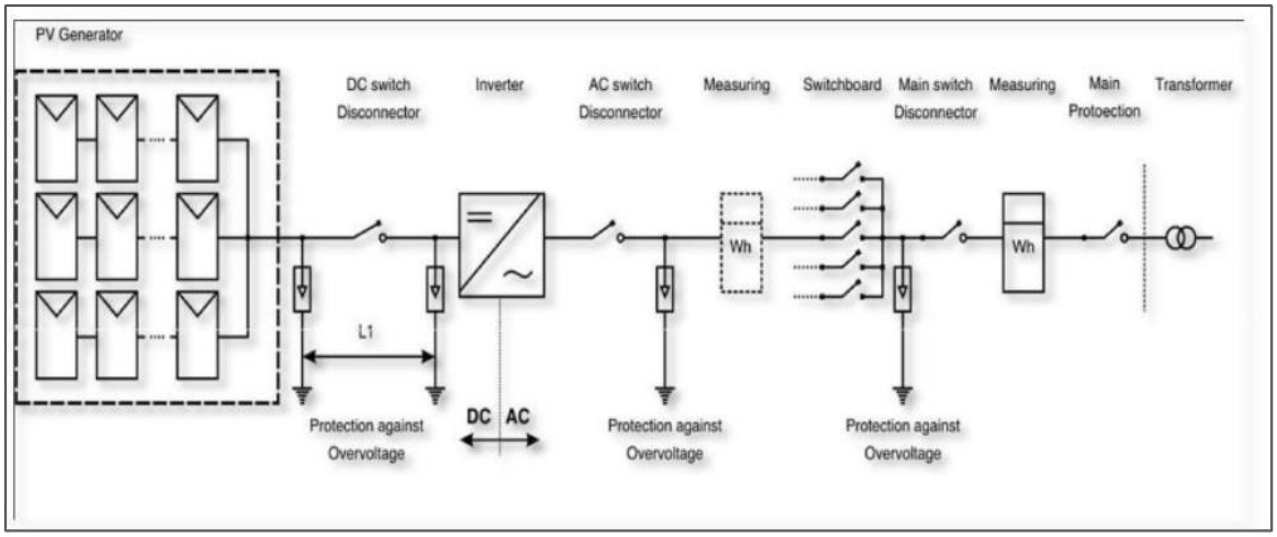
period (31/03/2013 to 30/03/2020) i.e., crediting period will start from 31/03/2013. The project is not registered with any other voluntary market (National or International). Hence, the criteria for double counting are not applicable for the project.

B.4. Project boundary, sources and greenhouse gases (GHGs)>>

The project boundary includes the physical, geographical site(s) of:

- As per AMS-I.D Version 18, EB 81 - "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".
- The project boundary includes the modules, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the UNIFIED INDIAN GRID. Therefore, the entire UNIFIED INDIAN GRID and all connected power plants have been considered in the project boundary for the proposed CDM project activity.

SCHEMATIC OR DIAGRAM SHOWING BOUNDARY



PROVIDE THE FOLLOWING TABLE AS NECESSARY FOR GHG SOURCES, LEAKAGE ETC INCLUDED AND EXLCUDED

EXAMPLE	Source	GHG	Included?	Justification/Explanation
Baseline	Grid connected electricity generation.	CO2	Included	Major source of emission
		CH4	Excluded	Major source of emission
		N2O	Excluded	Excluded for simplification. This is conservative
Project Activity	Greenfield solar Power Project Activity.	CO2	Excluded	No CO2 emissions are emitted from the project
		CH4	Excluded	Project activity does not emit CH4

		N2O	Excluded	Project activity does not emit N2O

B.5. Establishment and description of baseline scenario (UCR Standard or Methodology)

As the project activity is the installation of a Greenfield Solar power plant, the baseline scenario is the following as per applied methodology:
The baseline scenario is that the 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 into the grid

A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9[8] tCO_2/MWh for the 2013- 2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2023, the combined margin emission factor calculated from CEA database version 19[9] in India results into higher emission than the default value. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.

Net GHG Emission Reductions and Removals:

Thus, $ER_y = BE_y – PE_y – LE_y$
Where:
ER_y = Emission reductions in year y (tCO_2/y)
BE_y = Baseline Emissions in year y ($t CO_2/y$)
PE_y = Project emissions in year y (tCO_2/y)
LE_y = Leakage emissions in year y (tCO_2/y)

Baseline emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$\mathbf{BE_y = EG_{PJ,y} \; X \; EF_{grid,CM,y}}$$
Where:

[8] https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_09082220127104470.pdf page no 04
[9] https://cea.nic.in/wp-content/uploads/baseline/2024/01/User_Guide__Version_19.0.pdf

BE_y = Baseline emissions in year y (t CO_2/yr)

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year y

Project Emissions: For most renewable power generation projects activities PEy =0. As per applied methodology only emission associated with the fossil fuel combustion, emission from operation of geo-thermal power plants due to release of non-condensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity is a solar power project, Hence PE_y= 0

Leakage Emissions: No Leakage emissions are considered. The main emission potentially giving rise to leakage in the context of electrical sector projects is emission arising due to activities arising such as power plant construction and upstream emission from fossil fuel use (e.g. extraction, processing, and transport). These emission sources are neglected.
Hence, LE_y= 0

The actual emission reduction achieved during the first crediting period shall be submitted as a part of first monitoring and verification. However, for the purpose of an ex-ante estimation, following calculation has been submitted: Estimated annual baseline emission reductions

(BE_y) = 7,932 MWh/year *0.9 tCO2/MWh
= 7,139 tCO2e/year (i.e. 7,139 CoUs /year)

Year	**Baseline emissions (t CO_2e)**	**Project emissions (t CO_2e)**	**Leakage (t CO_2e)**	**Emission reductions (t CO_2e)**
31/03/2013 to 30/03/2014	7,248	0	0	7,248
31/03/2014 to 30/03/2015	7,211	0	0	7,211
31/03/2015 to 30/03/2016	7,175	0	0	7,175
31/03/2016 to 30/03/2017	7,139	0	0	7,139
31/03/2017 to 30/03/2018	7,102	0	0	7,102
31/03/2018 to 30/03/2019	7,066	0	0	7,066
31/03/2019 to 30/03/2020	7,029	0	0	7,029
Total	**49,970**	**0**	**0**	**49,970**
Total number of year	**7**			
Annual average over the	**7,139**			

crediting period	

B.6. Prior History>>

The project activity is not having prior history of any registration with any other mechanism.

B.7. Changes to start date of crediting period >>

There is no change in the start date of crediting period.

B.8. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

There are no permanent changes from registered PCN monitoring plan and applied methodology

B.9. Monitoring period number and duration>>

First Issuance Period:07 years, 00 months – 31/03/2013 to 30/03/2020

B.8. Monitoring plan>>

In current monitoring practices, the net electricity generation calculate by project activity is accounted for according to the share certificates which is provided by the GETCO (GUJARAT ENERGY TRANSMISSION CORPORATION LIMITED) which is the SLDC (State Load Dispatch Centre) for Gujarat. GETCO is the nodal agency in Gujarat state, which provides the share certificate to project participant. In the share certificate, the net electricity is already calculated as ($EG_{exports}$ - $EG_{imports}$) and the same is provided to project participants. Further, the Quantity of net electricity supplied to the grid will be cross checked from the controller data of generation.

Data/Parameter	$EG_{PJ,facility,y}$
Data unit	MWh/year
Description	Quantity of net electricity supplied to the grid for captive purpose as a result of the implementation of the GS4GG project activity in year y (MWh)
Source of data Value(s) applied	Share Certificates issued by GETCO 7,932 MWh/year
Measurement methods and procedures	Data Type: Measured Monitoring equipment: Meter Serial No – GJ1260A Make - Secure Energy Meters of accuracy class 0.2 are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: Once in 5 years Date of calibration – 11/01/2028

	Due date – 10/01/2023 Electricity exported/imported to the grid is in kWh. However, for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the grid by the project activity will be considered from the share certificates issued by GETCO (i.e. the SLDC - state load dispatch centre for Gujarat). Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the controller data of generation.
Monitoring frequency	Monthly
Purpose of data	The Data/ Parameter is required to calculate the baseline emission