Monitoring Report

CARBON OFFSET UNIT (CoU) PROJECT

Title: 7.39 MW Solar Power Project in Brazil by GYBR

Version 2.0

Date 29/08/2023

First CoU Issuance Period: 12 months

Monitoring Period: 01/01/2021 to 31/12/2021

Monitoring Report (MR)
CARBON OFFSET UNIT (CoU) PROJECT

Monitoring Report	
Title of the project activity	7.39 MW Solar Power Project in Brazil by GYBR
UCR Project Registration Number	310
Version	01
Completion date of the MR	29/08/2023
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 01 Duration of this monitoring Period: (first and last days included (01/01/2021 to 31/12/2021)
Project participants	**Project Owner**: GREENYELLOW DO BRASIL ENERGIA E SERVIÇOS LTDA. **Project Aggregator**: Kosher Climate India Private Limited.
Host Party	Brazil
Applied methodologies and standardized baselines	Applied Baseline Methodology: 1. AMS-I.D.: "Grid connected renewable electricity generation", version 18 2. AMS-I.F.: ""Renewable electricity generation for captive use and mini-grid", version 4.0 Standardized Methodology: Not Applicable
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated amount of GHG emission reductions for this monitoring period in the registered PCN	01/01/2021 – 31/12/2021: 6496 CoUs (6496 tCO_{2eq})
Total:	**6496 CoUs** (6496 tCO_{2eq})

SECTION A. Description of project activity

A.1. Purpose and general description of project activity >>

a) Purpose of the project activity and the measures taken for GHG emission reductions >>

The project **7.39 MW Solar Power Project in Brazil by GYBR** consists of several project activities installed in Brazil, located in the states of Minas Gerais, Rio de Janeiro, Goiás, Paraná and Mato Grosso, at the following villages: Jaíba (MG), Rio de Janeiro (RJ), Cabo Frio (RJ), Duque de Caxias (RJ), Goiania (GO), Londrina (PR), Varzea Grande (MT), and Rio Grande (GO). The promoter of the project is GREENYELLOW DO BRASIL ENERGIA E SERVIÇOS LTDA, a company which has the full ownership of the project activity.

Purpose of the project activity:
The purpose of the project activity is to generate electricity by harnessing the solar energy, making use of solar photovoltaic technology. The proposed project activity involves installation of Solar photovoltaic power generation projects at different locations, with a total capacity of 7.39MW.

Project Activity	Power Plant Name	Village/State	Energy Source	Installed capacity in kW	Annual generation in MWh/year	Commissioning date
1	Tucana 1	Jaíba (MG)	Solar PV	420 kW	1081 MWh/year	30/10/2018
2	Tucana 2	Jaíba (MG)	Solar PV	960 kW	2471 MWh/year	21/08/2018
3	Tucana 3	Jaíba (MG)	Solar PV	960 kW	2471 MWh/year	17/10/2018
4	Tucana 4	Jaíba (MG)	Solar PV	960 kW	2471 MWh/year	17/10/2018
5	Tucana 5	Jaíba (MG)	Solar PV	960 kW	2471 MWh/year	17/10/2018
6	Assaí Ayrton Senna	Rio de Janeiro (RJ)	Solar PV	850 kW	1399 MWh/year	25/04/2019
7	Assaí Cabo Frio	Cabo Frio (RJ)	Solar PV	250 kW	412.33 MWh/year	29/03/2019
8	Assaí Duque de Caxias	Duque de Caxias (RJ)	Solar PV	250 kW	391.05 MWh/year	01/04/2019
9	Assaí Goiânia	Goiânia (GO)	Solar PV	750 kW	1460 MWh/year	01/01/2018
10	Assaí Rio Verde	Rio Verde (GO)	Solar PV	600 kW	1091.09 MWh/year	29/04/2019
11	Assaí Londrina	Londrina (PR)	Solar PV	182,8 kW	316.54 MWh/year	19/09/2019
12	Assaí Cristo Rei	Várzea Grande (MT)	Solar PV	250 kW	454.4 MWh/year	04/01/2017

Having each power plant an installed capacity equal or under 5 MW, they are classified as *mini generation* units under the *electricity compensation system* regulated by Brazil's ANEEL (National Electric Energy Agency), in accordance with normative resolutions n. 482/2012, n. 687/2015, and federal law n. 14.300/2022. Under the electricity compensation system, the active energy injected by a consumer unit with distributed mini-generation is transferred, through a free loan, to the local distributor and then subsequently compensated with consumption offsetting.

By installing solar plants to offset the consumption of businesses, Project Owner is able to provide them with energy from the Solar Plants within the energy compensation scheme: the generated electricity is injected into the national grid, whereas customers receive credits that are offset in their monthly energy bill. Therefore, the project activity has the purpose of contributing to the transformation of the Brazilian energy matrix through the economic incentives of a clean, renewable, and cheaper energy source.

b) Brief description of the installed technology and equipment>>

Project activity consists of 12 solar photovoltaic installations, already installed, commissioned and under operation. The installed technologies convert the solar radiation into electrical energy through photovoltaic (PV) panels. This energy is further inverted into electricity.

The different components of a solar photovoltaic plant are:

1. Photovoltaic (PV) modules,
2. Central Inverters,
3. Transformers,
4. Other relay and protection systems.

Project Activities 1, 2, 3, 4 and 5 are assets of the same power plant – a grid connected solar farm with total capacity of 4260 kW, whereas Project Activities 6, 7, 8, 9, 10, 11, 12 are different solar plants installed on the roof of different branches of a supermarket chain.

c) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)>>

UCR Project ID or Date of Authorization: 310
Start Date of Crediting Period: 01/01/2021
Project Commissioned:

Project Activity	**Power Plant Name**	**Commissioning date**
1	Tucana 1	30/10/2018
2	Tucana 2	21/08/2018
3	Tucana 3	17/10/2018
4	Tucana 4	17/10/2018
5	Tucana 5	17/10/2018
6	Assaí Ayrton Senna	25/04/2019

7	Assaí Cabo Frio	29/03/2019
8	Assaí Duque de Caxias	01/04/2019
9	Assaí Goiânia	01/01/2018
10	Assaí Rio Verde	29/04/2019
11	Assaí Londrina	19/09/2019
12	Assaí Cristo Rei	04/01/2017

d) Total GHG emission reductions achieved or net anthropogenic GHG removals by sinks achieved in this monitoring period>>

The total GHG emission reductions achieved in this monitoring period is as follows:

Summary of the Project Activity and ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	01/01/2021
Carbon credits claimed up to	31/12/2021
Total ERs generated (tCO_{2eq})	5737.25 tCO_{2eq}
Leakage	00

e) Baseline Scenario>>

Project Activities 1-5:

As per the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

"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".

The project activity involves setting up new solar power plants to harness the power of solar energy and inject electricity into the Brazilian regional grid. In the absence of the project activity, the equivalent amount of power would have been generated by the operation and/or insertion of more- GHG-intensive grid-connected power plants. Hence, the baseline for the project activity is the equivalent amount of power produced at the Brazilian grid.

Project Activities 6-12:

As per the approved consolidated methodology AMS-I.F, version 4, the baseline scenario is the following:

"*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.*"

Similar to the project activities 1-5, the solar rooftops comprehended in the project activities 6-12 are also operating based on the harnessing of the power of sunlight to produce electricity and supply it to the consumer units and to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Brazilian electricity grid. Hence, the baseline for the project activity is the equivalent amount of power from the Brazilian grid.

A.2. Location of project activity>>

Project Activity consists of 12 Solar photovoltaic power generation plants installed at different locations throughout Brazil:

Project Activity	**Country**	**State**	**Village**	**Latitude**	**Longitude**
1	Brazil	Minas Gerais	Jaíba	15°18'36,0"S	43°42'00,0"W
2	Brazil	Minas Gerais	Jaíba	15°18'36,0"S	43°42'00,0"W
3	Brazil	Minas Gerais	Jaíba	15°18'36,0"S	43°42'00,0"W
4	Brazil	Minas Gerais	Jaíba	15°18'36,0"S	43°42'00,0"W
5	Brazil	Minas Gerais	Jaíba	15°18'36,0"S	43°42'00,0"W
6	Brazil	Rio de Janeiro	Rio de Janeiro	22º95'91,9"S	43º35'68,4"W
7	Brazil	Rio de Janeiro	Cabo Frio	22º88'71,8"S	42º05'19,3"W
8	Brazil	Rio de Janeiro	Duque de Caxias	22º77'56,7"S	43º30'90,3"W
9	Brazil	Goiás	Goiânia	16º66'33,2"S	49º25'54,3"W
10	Brazil	Goiás	Rio Verde	17°48'27,4"S	50°55'22,6"W
11	Brazil	Paraná	Londrina	23º25'99,3"S	51º16'00,1"W
12	Brazil	Mato Grosso	Várzea Grande	15°38'20,6"S	56°06'06,3"W

A.3. Parties and project participants >>

Party (Host)	Participants
Brazil	**Project Owner:** GREENYELLOW DO BRASIL ENERGIA E SERVIÇOS LTDA.
India	**Project Aggregator:** KOSHER CLIMATE INDIA (P) LTD.

A.4. References to methodologies and standardized baselines >>

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

TYPE – I - Renewable Energy Projects

CATEGORY –

1. AMS. I.D. (Title: "Grid connected renewable electricity generation", version 18)
2. AMS.I.F. (Title: "Renewable electricity generation for captive use and mini-grid", version 4.0)

A.5. Crediting period of project activity >>

Length of the crediting period corresponding to this monitoring period: 12 months – 01/01/2021-31/12/2021.

A.6. Contact information of responsible persons/entities >>

UCR ID – 310
Kosher Climate India Private Limited
Name: Narendra Kumar
Email ID – narendra@kosherclimate.com

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity >>

a) Provide information on the implementation status of the project activity during this monitoring period in accordance with UCR PCN>>

Project activity consists of 12 solar photovoltaic installations, already installed and commissioned, whose technology converts the solar radiation into electricity. The solar PV plant is composed of PV modules, Central Inverters, Transformers and other relay and protection systems.

Project Activities 1-5:

Project Activities 1, 2, 3, 4 and 5 are assets of the same solar farm, constructed in 2018 and commissioned on 19/06/2018. Project Activities sum up a total capacity of 4260 kW.

Parameter	Description
Number of **Photovoltaic Modules**	16060
Capacity of **Photovoltaic Modules**	320 kWp
Manufacturer/Model of **Photovoltaic Modules**	JA Solar/ JAP6-320P
Number of **Inverters**	73
Capacity of **Inverters**	60 kW
Manufacturer/Model of **Inverters**	ABB/ Trio 60
Number of **Transformers**	5
Capacity of **Transformers**	1 MVA

Project Activities 6-12:

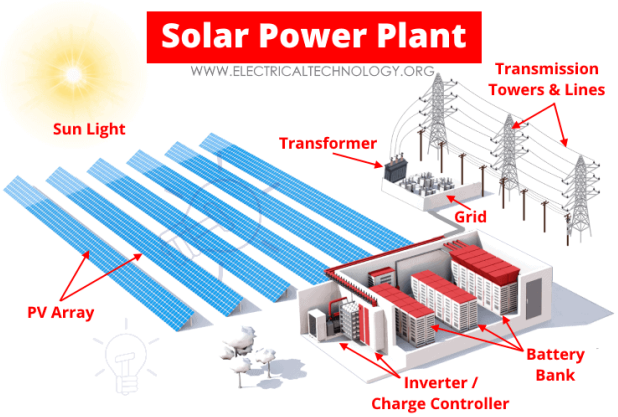
Project Activity 6, 7, 8, 9, 10, 11, 12 are different solar plants installed on the roof of different branches of a supermarket chain. Project Activities were constructed and commissioned between 2017 and 2021.

Parameter/ Project Activity	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Number of **PV Modules**	3060	900	900	2880	2160	680	1152
Capacity of **PV Modules**	325 Wp	325 Wp	325 Wp	320 Wp	325 Wp	320 Wp	260 Wp
Manufacturer/ Model of **PV Modules**	JA Solar/ JAP72S01-325/SC	JA Solar/ JAP72S01-325/SC	JA Solar/ JAP72S01-325/SC	JA Solar/ JAP6(K) – 72-320/4BB	JA Solar/ JAP72S01-325/SC	JA Solar/ JAP6(K)-72-320/4BB	Canadian Solar/ CS6P 260P
Number of **Inverters**	9	5	5	15	6	5	5

Capacity of **Inverters**	8 x 100 kW 1 x 50 kW	50 kW	50 kW	50 kW	100 kW	2 x 50 kW 3 x 27.6 kW	50 kW
Manufacturer/ Model of **Inverters**	ABB/ PVS-100- 400; TRIO- TM-50.0-400	ABB/ TRIO-TM-50.0-400	ABB/ TRIO-TM-50.0-400	ABB/ TRIO 50.0-TL-OUTD	ABB/ PVS-100TL	ABB/ TRIO-TM-50.0-400; TRIO-27.6-TL-OUTD	ABB/ TRIO 27.6TL
Number of **Transformers**	2	1	2	2	2	1	1
Capacity of **Transformers**	500 kVA	1000 kVA	500 kVA	500 kVA	500 kVA	1000 kVA	1000 kVA

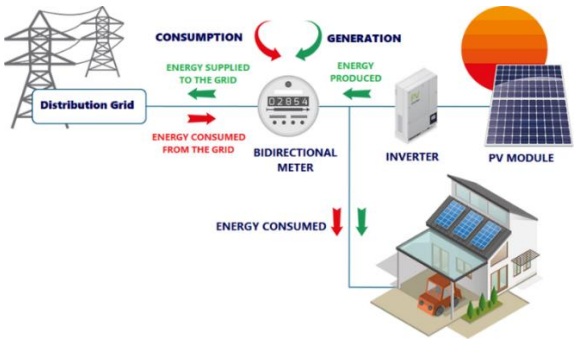
b) For the description of the installed technology(ies), technical process and equipment, include diagrams, where appropriate>>

Project Activities 1-5 – Boundary:



Source: Electrical Technology

Project Activities 6-12 – Boundary:



Source: Inovacare Solar, translation provided.

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

There is no harm associated with project activity, and hence an environmental impact assessment study wasn't required by Brazilian regulations: according to the National Environment Council's (CONAMA) Resolution nº 1/1986[1], electricity generation plants under 10 MW are exempted from preparing an environmental impact study to be submitted for approval by the competent state body. Thus, no mitigation measures are applicable.

Instead, there are social, environmental, economic and technological benefits which contribute to sustainable development, as described:

Social benefits:

- Employment opportunities created for the local workforce: 64 opportunities created during Construction phase of projects headed by Project Owner in 2022;
- Employment opportunities created for the local workforce: 21 opportunities created during Operation phase of projects headed by Project Owner in 2022;
- Volunteer programs held by Project Owner every year;
- Social programs held by Project Owner: investment in social programs is expected to reach BRL 332,933.00 in 2023.

Environmental benefits:

- Energy efficiency and autonomy: Project Activities minimizes the import of energy from the Brazilian national grid which is more GHG intensive;
- Energy efficiency and autonomy: Project Activities minimizes the dependence of the Brazilian energy matrix on fossil fuels;
- Emission Reductions: Project Activities avoids 5737.25 tCO_{2eq} to be released into the atmosphere during the crediting period;
- Volunteer programs held by Project Owner: 1408 trees voluntarily planted;

Economic benefits:

- Employment opportunities created for the local workforce: 64 opportunities created during Construction phase of projects headed by Project Owner in 2022;
- Employment opportunities created for the local workforce: 21 opportunities created during Operation phase of projects headed by Project Owner in 2022;
- Energy efficiency and autonomy: Project Activities cause economic benefits by minimizing the import of energy, displacing 14563.4 MWh from the Brazilian national grid during the crediting period;
- Energy efficiency and autonomy: energy generation from Project Activities spare the consumers with lower energy bills.

B.3. Baseline Emissions>>

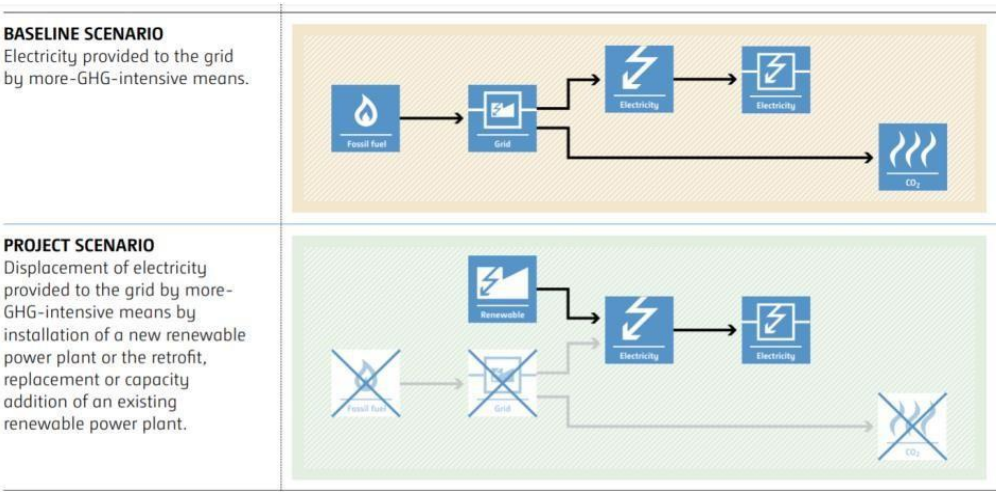
Project activity involves harnessing the power of solar energy to produce electricity and to supply it to the local distributor, subsequently offsetting the energy consumption of the customers. The baseline scenarios identified at the PCN stage of the project activities are:

Project Activities 1-5:

In the absence of the project, the equivalent amount of power would have been supplied by the operation of grid-connected power plants and by the addition of other-more-GHG-intensive

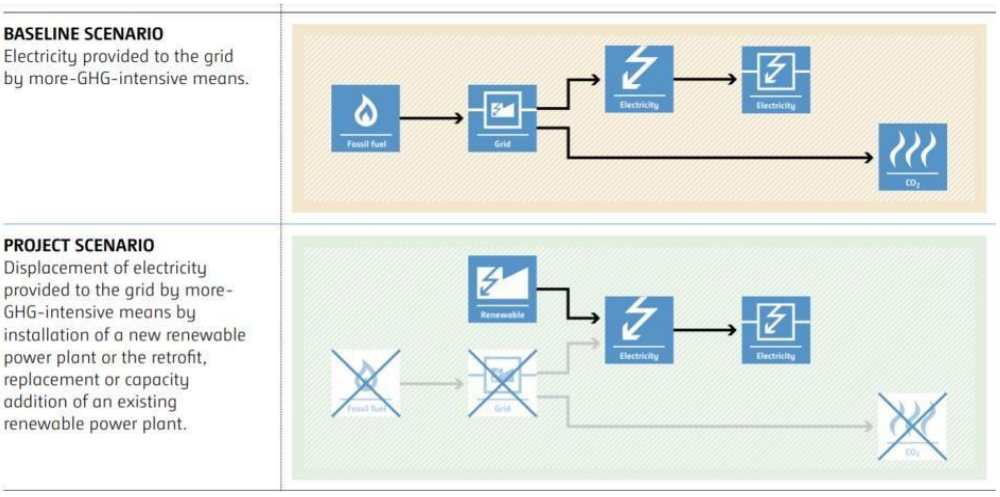
[1] The referred Resolution has been provided with translation in the folder > 6.Other > CONAMA Resolution.

generation sources. Therefore, the baseline scenario for the project activity, as per methodology AMS.I-D, is the equivalent amount of electricity generated from the Brazilian national grid.



Project Activities 6-12:

In the absence of the project, the equivalent amount of power would have been supplied by the operation of grid-connected power plants and by the addition of other-more-GHG-intensive generation sources, since project activities displace electricity consumed from the grid. Therefore, the baseline scenario, as per methodology AMS.I-F, is the equivalent amount of electricity generated from the Brazilian national grid.



B.4. Debundling>>

Project activity is a small-scale project and it is not de-bundled component of any larger project.

SECTION C. Application of methodologies and standardized baselines

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

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

TYPE I - Renewable Energy Projects

CATEGORY –
1. AMS. I.D. (Title: "Grid connected renewable electricity generation", version 18)
2. AMS.I.F. (Title: "Renewable electricity generation for captive use and mini-grid", version 4.0)

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

There are 2 applicable methodologies related to Project activity, as follows:

I. Project activities 1-5 concerns the generation of grid connected electricity from the construction and operation of solar power-based power projects with an installed capacity of 4260 kW, qualifying as a small- scale project activity under Type-I of the Small-Scale methodology. The project status corresponds to the methodology AMS-I.D. version 18, and its applicability is discussed below:

Applicability Criterion	Project Case
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: a. Supplying electricity to a national or a regional grid; or b. Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	All the project activities involve setting up of a renewable energy (photovoltaic) generation plant that injects electricity to the Brazilian regional grid system. Thus, the project meets applicability conditions (a).
2. This methodology is applicable to project activities that: a. Install a Greenfield plant; b. Involve a capacity addition in (an) existing plant(s); c. Involve a retrofit of (an) existing plant(s); d. Involve a rehabilitation of (an) existing plant(s); or e. Involve a replacement of (an) existing plant(s)	Project activity is a Greenfield plant and satisfies this applicability condition (a), since it involves the installation of new solar photovoltaic power plants in Brazil.
3. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: a. The project activity is implemented in existing reservoir, with no change in the volume of the reservoir; or b. The project activity is implemented in existing reservoir, where the volume of the reservoir(s) is increased and the power density as per definitions given in the project emissions section, is greater than 4 W/m^2.	The project activity involves the installation of Solar photovoltaic plants. Hence, this criterion is not applicable.

c. 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/m2.	
4. If the new unit has both renewable and non-renewable components (e.g., a wind/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 fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The proposed project is a 4260 kW solar power project, with no non-renewable components involved in the project. The criterion is therefore not applicable.
5. Combined heat and power (co-generation) systems are not eligible under this category.	Not relevant to the project activity, since it involves only solar photovoltaic power generating units.
6. In the case of project activities that involve the capacity 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 distinct from the existing units.	There is no other existing renewable energy power generation facility at the project site. Therefore, this criterion is not applicable.
7. In the case of retrofit or replacement, to qualify as a small- scale project, the total output of the retrofitted or replacement power plant/unit shall not exceed the limit of 15 MW.	The project activity is a new installation, it does not involve any retrofit measures nor any replacement and hence is not applicable.
8. 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.	Not relevant to the project activity as it involves only solar photovoltaic power generating units.
9. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	Not relevant to the project activity as it involves only solar photovoltaic power generating units.

II. Project Activities 6-12 consists of different solar plants installed on the roof of branches of a supermarket chain, with the main purpose of supplying electricity to the user (supermarket): by instantaneously consuming the electricity generated by the solar photovoltaic systems, project displaces grid electricity consumption – while excess electricity may be supplied to the grid.
The project status corresponds to the methodology AMS-I.F. version 4, and its applicability is discussed below:

Applicability Criterion	Project Case
1. This methodology is applicable to project activities that:	Project activity is a Greenfield renewable energy power plant at a site where there was no renewable generation

<table>
<tr><td>(a) Install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant);
(b) Involve a capacity addition;
(c) Involve a retrofit of (an) existing plant(s);
(d) Involve a replacement of (an) existing plant(s).</td><td>unit operating. Therefore, it satisfies this applicability condition (a).</td></tr>
<tr><td>2. Illustration of respective situations under which each of the methodology (AMS-I.D., AMS-I.F. and AMS-I.A.5) applies is included in table below:
<table>
<tr><th>Project Type</th><th>AMS - I.A</th><th>AMS - I.D</th><th>AMS - I.F</th></tr>
<tr><td>Project supplies electricity to a national/regional grid</td><td></td><td>✓</td><td></td></tr>
<tr><td>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)</td><td></td><td></td><td>✓</td></tr>
<tr><td>Project supplies electricity to an identified consumer facility via national/regional grid (through a contractual arrangement such as wheeling)</td><td></td><td>✓</td><td></td></tr>
<tr><td>Project supplies electricity to a mini grid6 system where in the baseline all generators use exclusively fuel oil and/or diesel fuel</td><td></td><td></td><td>✓</td></tr>
<tr><td>Project supplies electricity to household users (included in the project boundary) located in off grid areas</td><td></td><td>✓</td><td></td></tr>
</table></td><td>Project activity relates to grid connected rooftop power projects installed at the rooftops of consumer facilities, therefore displacing the grid electricity that would have been consumed in the baseline scenario.
Hence, the condition for methodology AMS-I.F is justified.</td></tr>
<tr><td>3. In the case of project activities that involve the capacity 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 distinct from the existing units.</td><td>The proposed project does not involve the capacity addition of existing renewable power generation facilities, hence this criterion is not applicable.</td></tr>
<tr><td>4. 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.</td><td>The proposed project is not a retrofit or replacement of existing renewable power generation facilities, hence this criterion is not applicable.</td></tr>
<tr><td>5. If the unit added has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the unit added co-fires fossil fuel, the</td><td>The proposed project is a 3130 kW solar power project, with no non-renewable components involved in the project. The criterion is therefore not applicable.</td></tr>
</table>

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.	Not applicable to the project activity since it concerns solar photovoltaic generation units only.
7. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: (a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir; (b) The project activity is implemented in an existing reservoir, 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; (c) 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/m2.	Not applicable to the project activity since it concerns solar photovoltaic generation units only.
8. If electricity and/or steam/heat produced by the project activity is delivered to a third party, i.e. another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered that ensures that there is no double counting of emission reductions.	The electricity generated at the solar roofs of the supermarkets is utilized by the supermarkets themselves. The energy generation equipment of the solar roofs belongs to the Project Owner and are rented to the supermarkets within a long-term agreement. Thus, the energy generation does not turn out to be utilized twice and hence the emission reductions will not be double counted.
9. In the case the project activities utilize biomass, the "TOOL16: Project and leakage emissions from biomass" shall be applied to determine the relevant project emissions from the cultivation of biomass and the utilization of biomass or biomass residues.	Not applicable to the project activity since it does not utilize biomass.

C.3 Applicability of double counting emission reductions >>

There is no double counting of emission reductions for the project activities due to the following reasons:

- Installations are uniquely identifiable based on its location coordinates;
- Project has dedicated commissioning certificates and connection points;
- Project is associated with energy meters which are dedicated to the consumption point for project developers.
- Projects are registered under I-REC Standard (links are presented next) and are in registration process under JUNDU Standard, however the issuance of credits for the proposed crediting period (01/01/2021 - 31/12/2021) will be done exclusively under UCR.

Project Activity	Power Plant Name	I-REC Link
1	Tucana 1	TUCA-01D
2	Tucana 2	
3	Tucana 3	
4	Tucana 4	
5	Tucana 5	
6	Assaí Ayrton Senna	TASA-01S

7	Assaí Cabo Frio	TASC-01F
8	Assaí Duque de Caxias	TASD-01C
9	Assaí Goiânia	TASS-01G
10	Assaí Rio Verde	TASR-01V
11	Assaí Londrina	TASS-01L
12	Assaí Cristo Rei	TASC-01R

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

Project Activities 1-5:

As per applicable methodology AMS-I.D., version 18:

"The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to."

Thus, the project boundary includes the solar photovoltaic modules and the respective Brazilian grid system, as per the following scenario:

Scenario	Source	GHG	Included?	Justification/Explanation
Baseline	Electricity generation in fossil fuel fired power that is dispatched due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Not identified in the baseline methodology
		N_2O	No	Not identified in the baseline methodology
Project Activity	Electricity generation in the project activity	CO_2	No	Zero-emissions grid connected electricity generation from renewable energy
		CH_4	No	Zero-emissions grid connected electricity generation from renewable energy
		N_2O	No	Zero-emissions grid connected electricity generation from renewable energy

Project Activities 6-12:

As per applicable methodology AMS-I.F., version 5:

"The spatial extent of the project boundary includes industrial, commercial facilities consuming energy generated by the system. In the case of electricity generated and supplied to distributed users (e.g. residential users) via mini/isolated grid(s) the project boundary may be confined to physical, geographical site of renewable generating units. The boundary also extends to the project power plant and all power plants connected physically to the electricity system to which the project power plant is connected."

Thus, the project boundary includes the solar photovoltaic roof systems and the commercial facilities (the supermarkets) consuming the energy generated, as per the following scenario:

Scenario	Source	GHG	Included?	Justification/Explanation
Baseline	Electricity generation in fossil fuel fired power that is dispatched due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Not identified in the baseline methodology
		N_2O	No	Not identified in the baseline methodology
Project Activity	Electricity generation in the project activity	CO_2	No	Zero-emissions grid connected electricity generation from renewable energy
		CH_4	No	Zero-emissions grid connected electricity generation from renewable energy
		N_2O	No	Zero-emissions grid connected electricity generation from renewable energy

C.5. Establishment and description of baseline scenario (UCR Protocol) >>

Project Activities 1-5:

As per paragraph 19 of the approved consolidated methodology AMS-I.D., version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

"*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.*"

The project activity involves setting up new solar power plants to harness the power of solar energy and inject electricity into the Brazilian regional grid. In the absence of the project activity, the equivalent amount of power would have been generated by the operation and/or insertion of more- GHG-intensive grid-connected power plants. Hence, the baseline for the project activity is the equivalent amount of power produced at the Brazilian 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. As per the most recent data from Brazil's Ministry of Science and Technology[2] (data of 2021) and the proper calculation methodology, the grid emission factor of Brazil is **0.39395 tCO_2/MWh**.

Net GHG Emission Reductions and Removals:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y = Emission reductions in year y (tCO_2/y)
BE_y = Baseline Emissions in year y (tCO_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 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:

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

Where:

BE_y = Baseline emissions in year y (tCO_2)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of this project activity in year y (MWh)
$EF_{grid,y}$ = Brazilian Ministry of Science and Technology recommends an emission factor of 0.39395 tCO_2/MWh.

Project Emissions:

As per paragraph 39 of AMS-I.D. (version 18, dated 28/11/2014), for most renewable energy project activities emission is zero. Since, all the projects are run of river project and does not involve any reservoir, the project emission is zero.

Hence, $PE_y = 0$

Leakage:

As per paragraph 22 of AMS-I.D. version-18, 'If the energy generating equipment is transferred from another activity, leakage is to be considered.' In the project activity, there is no transfer of energy generating equipment and therefore the leakage from the project activity is considered as zero.

Hence, $LE_y = 0$

The actual emission reduction achieved during the first CoU 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:

Project Activity -1
Estimated annual baseline emission reductions (BE_y)

= 1081 MWh/year x 0.39395 tCO_2/MWh
= 425.85 tCO_2/year (i.e., 425.85 CoUs/year)

Project Activity -2
Estimated annual baseline emission reductions (BE_y)

= 2471 MWh/year x 0.39395 tCO_2/MWh

= 973.45 tCO_2/year (i.e., 973.45 CoUs/year)

Project Activity -3
Estimated annual baseline emission reductions (BE_y)

= 2471 MWh/year x 0.39395 tCO_2/MWh
= 973.45 tCO_2/year (i.e., 973.45 CoUs/year)

Project Activity -4
Estimated annual baseline emission reductions (BE_y)

= 2471 MWh/year x 0.39395 tCO_2/MWh
= 973.45 tCO_2/year (i.e., 973.45 CoUs/year)

Project Activity -5
Estimated annual baseline emission reductions (BE_y)

= 2471 MWh/year x 0.39395 tCO_2/MW

= 973.45 tCO_2/year (i.e., 973.45 CoUs/year)

Project Activities 6-12:

As per the approved consolidated methodology AMS-I.F, version 4, the baseline scenario is the following:

"*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.*"

Similar to the project activities 1-5, the solar rooftops comprehended in the project activities 6-12 are also operating based on the harnessing of the power of sunlight to produce electricity and supply it to the consumer units and to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Brazilian electricity grid. Hence, the baseline for the project activity is the equivalent amount of power from the Brazilian 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. As per the most recent data from Brazil's Ministry of Science,Technology and Innovation[2] (data of 2021) and the proper calculation methodology, the grid emission factor of Brazil is **0.39395 tCO_2/MWh**.

Net GHG Emission Reductions and Removals:

$$ER_y = BE_y - PE_y - LE_y$$

Where:
ER_y = Emission reductions in year y (tCO_2/y)
BE_y = Baseline Emissions in year y (tCO_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 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:

$$BE_y = EG_{BL,y} \times EF_{grid,y}$$

Where:

BE_y = Baseline emissions in year y (tCO_2)

$EG_{BL,y}$ = Quantity of net electricity generation that is produced and displaced as a result of the implementation of this project activity in year y (MWh)[2] CO2 emission factors for electricity generation in the National Interconnected System of Brazil - Base Year 2021.

$EF_{grid,y}$ = Brazilian Ministry of Science, Technology and Innovation recommends an emission factor of 0.39395 tCO_2/MWh.

Project Emissions:

As per paragraph 39 of AMS-I.D. (version 18, dated 28/11/2014), for most renewable energy project activities emission is zero. Since, all the projects are run of river project and does not involve any reservoir, the project emission is zero.

Hence, $PE_y = 0$

Leakage:

As per paragraph 22 of AMS-I.D. version-18, 'If the energy generating equipment is transferred from another activity, leakage is to be considered.' In the project activity, there is no transfer of energy generating equipment and therefore the leakage from the project activity is considered as zero.

Hence, $LE_y = 0$

The actual emission reduction achieved during the first CoU 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:

Project Activity -6
Estimated annual baseline emission reductions (BE_y)

= 1399 MWh/year x 0.39395 tCO_2/MWh
= 551.13 tCO_2/year (i.e., 551.13 CoUs/year)

Project Activity -7
Estimated annual baseline emission reductions (BE_y)

= 412.33 MWh/year x 0.39395 tCO_2/MWh
= 162.43 tCO_2/year (i.e., 162.43 CoUs/year)

Project Activity -8
Estimated annual baseline emission reductions (BE_y)

= 391.05 MWh/year x 0.39395 tCO_2/MWh
= 154.05 tCO_2/year (i.e., 154.05 CoUs/year)

Project Activity -9
Estimated annual baseline emission reductions (BE_y)

= 1460 MWh/year x 0.39395 tCO_2/MWh
= 575.16 tCO_2/year (i.e., 575.16 CoUs/year)

Project Activity -10
Estimated annual baseline emission reductions (BE_y)

= 1091.09 MWh/year x 0.39395 tCO_2/MWh
= 429.79 tCO_2/year (i.e., 429.79 CoUs/year)

Project Activity -11
Estimated annual baseline emission reductions (BE_y))

= 316.54 MWh/year x 0.39395 tCO_2/MWh
= 124.7 tCO_2/year (i.e., 124.7 CoUs/year)

Project Activity -12
Estimated annual baseline emission reductions (BE_y)

= 454.4 MWh/year x 0.39395 tCO_2/MWh
= 179 tCO_2/year (i.e., 179 CoUs/year)

Emission reductions calculation for the monitoring period is given in the table below:

Monitoring period: 01/01/2021 - 31/12/2021				
Project Activity	**Estimated Generation (MWh/year)**	**Actual Generation (MWh)**	**Emission Factor**	**Emission Reduction (tCO_2)**
1	1081 MWh/year	2269.4	0.39395	894.03013
2	2471 MWh/year	2314.2	0.39395	911.67909

3	2471 MWh/year	2286.9	0.39395	900.924255
4	2471 MWh/year	2300.9	0.39395	906.439555
5	2471 MWh/year	1208.2	0.39395	475.97039
6	1399 MWh/year	1238.4	0.39395	487.86768
7	412.33 MWh/year	431.3	0.39395	169.910635
8	391.05 MWh/year	370.3	0.39395	145.879685
9	1460 MWh/year	1270.8	0.39395	500.63166
10	1091.09 MWh/year	123.7	0.39395	48.731615
11	316.54 MWh/year	309.5	0.39395	121.927525
12	454.4 MWh/year	439.8	0.39395	173.25921
		14563,4		**5737.25143**

C.6. Prior History>>

The project activity has not applied to any other GHG program for generation or issuance of carbon offsets or credits for the said crediting period.

C.7. Monitoring period number and duration>>

First Issuance Period: 12 months – 01/01/2021 – 31/12/2021.

C.8. Changes to start date of crediting period >>

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

C.9. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

The present document is the Monitoring Report version 2.0, which presents changes from PCN monitoring plan as per the Verification process.

C.10. Monitoring plan>>

Project Activities 1-5:

Data and Parameters available at validation (ex-ante values):

Data/Parameter	Brazilian Government recommended emission factor
Data unit	tCO_2/MWh
Description	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 Brazilian Ministry of Science, Technology and Innovation publishes yearly emission factors for the energy generation. Applying the referred methodology calculations, the applicable estimated emission factor is 0.39395 tCO_2/MWh.
Source of data	1. Official data: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e- ferramentas/fatores-de-emissao 2. Calculated Emission Factor: in the folder 4.Stantard documents >

	Emission Factor Calculation.
Value(s) applied	0.39395 tCO_2/MWh.

Measurement methods and procedures	-
Monitoring frequency	Ex-ante fixed parameter
Purpose of data	Calculation of Emission Factor of the grid

Data and Parameters to be monitored (ex-post monitoring values):

Data / Parameter:	$EG_{PJ,y}$
Data unit:	MWh/year
Description:	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of this project activity in year y (MWh)
Source of data:	Monthly Joint Meter Readings (JMRs)
Value(s) applied	4089.02 MWh
Measurement procedures (if any):	The Net electricity generation by the Solar power plant is recorded by the project proponent in the record logs. At the end of every month, Energy bill is generated based on the total monthly electricity exported to the grid.
Monitoring frequency:	Monthly
QA/QC procedures:	Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project participant to the grid.
Any comment:	-

Project Activities 6-12:

Data and Parameters available at validation (ex-ante values):

Data/Parameter	Brazilian Government recommended emission factor
Data unit	tCO^2 /MWh
Description	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 Brazilian Ministry of Science, Technology and Innovation publishes yearly emission factors for the energy generation. Applying the referred methodology calculations, the applicable estimated emission factor is 0.39395 tCO_2/MWh.
Source of data	1. Official data: https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao 2. Calculated Emission Factor: in the folder 4.Stantard documents > Emission Factor Calculation.
Values applied	0.39395 tCO_2/MWh

Data and Parameters to be monitored (ex-post monitoring values):

Data / Parameter:	$EG_{BL,y}$
Data unit:	MWh/year

Description:	Quantity of net electricity generation displaced by the project activity in year y (MWh)
Source of data:	Monthly Joint Meter Readings (JMRs)
Value(s) applied	1648.2 MWh
Measurement procedures (if any):	The Net electricity generation by the Solar power plant is recorded by the project proponent in the record logs. At the end of every month, Energy bill is generated based on the total monthly electricity displaced.
Monitoring frequency:	Monthly
QA/QC procedures:	Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project participant to the grid.
Any comment:	The calibration and meter details are provided below.

Small scale renewable energy generation in Brazil:
Small scale grid connected renewable energy generation was introduced in Brazil in 2012, by the regulation REN 482/2012, issued by the National Agency of Electrical Energy (ANEEL). It allowed the consumer from the Captive Market to become also an energy supplier to the grid and, with that, to benefit itself and other affiliates by reducing the energy consumed from the DisCo. The regulation comprised renewable energy generation systems installed close to the load centers, usually even at the same site of the loads (e.g. rooftop photovoltaic systems), thus using only the distribution grid (lower voltage and shorter distances) instead of the transmission grid (higher voltage and longer distances). Those systems are categorized as Distributed Generation (DG) and the maximum installed capacity per system is 5 MW.

There are currently 1.419.624 DG systems in operation, summing over 15 GW of installed capacity. About 99% of those systems are from the Solar Photovoltaic source and have installed capacities lower than 100kW, which are mainly represented by solar rooftop grid-tie systems for local self-consumption. Less than 1% of the systems have installed capacity over 1 MW, which are mainly solar farms for energy grid export (ANEEL GD data from 11/2022).

Within the DG, the energy generated has to firstly fulfill the consumption of the site where it is installed, so only the surplus can be virtually either exported to other consumption affiliated site or stored in form of credits valid for up to 60 months. The DG energy generators are not like Independent Power Producers (IPP), but “Prosumers”, which means a consumer that is additionally a producer for its own and affiliates. It is a much more simplified scheme than the IPPs one.

Metering in small scale renewable energy generation in Brazil:
As explained, the DG systems are installed in the consumer units supplied (in energy) by the DisCos within the Captive Market scheme. Therefore, the meters are installed, operated and maintained by the DisCos. The basic functioning of the metering procedure works as following: the meters measure both the energy that comes from the grid (consumption) and the energy that goes into the grid (surplus export). The DisCo meter is therefore capable of accounting for the energy generation in systems that generates energy for grid exporting purposes. On the other hand, it is not capable of accounting for the energy generation in systems that generates energy for local self-consumption, as a large portion of the energy generated is instantaneously consumed, without going to the grid and consequently without being registered by the DisCo meter. Due to this functioning and to the existence of these 2 different profiles of the DG units, 2 different energy metering situations can be identified:

 DG profile that generates energy exclusively for grid export: this is the case of the Solar Farms.
As the energy generation is exclusively for grid export, the only energy that is not exported (thus not accounted as export by the meter) is a very low portion that refers to the power plant selfconsumption. Therefore, for this profile, the energy generation is well reflected by the DisCo meter (and by the DisCo monthly invoice data). In these cases, in arrangements similar to Power Purchase Agreements, the DisCo meter data (and DisCo monthly invoice data) are the source of data used for billing purposes; no meters calibration certificates are usually required as the providing and O&M of the meters are a legal responsibility of the DisCo with the national government, thus access to it is restricted to the DisCo.

 DG profile that generates energy for local self-consumption: this is the case of the Solar Rooftop Systems. As the

energy generation is mainly for local self-consumption, a large portion of the energy generation ends up being instantaneously locally consumed, thus not being accounted by the DisCo meter. Therefore, for this profile, the data from the DisCo meter (and from the DisCo monthly invoice) does not properly reflect the total energy generation, as all the energy that was generated and instantaneously consumed will not be accounted. Therefore, for those types of systems, the energy generation measuring is done via Monitoring Systems installed along with the energy generation system. For solar energy, it is very common that the photovoltaic inverter manufacturer also provides a Monitoring System. In these cases, in arrangements similar to Power Purchase Agreements, the Monitoring Systems data is commonly used for billing purposes, and no calibration certificates are required as they are not available.

Conclusions and Final Considerations:
The conclusions and final considerations of the discussed content, in line with the purpose of the present document, are summarized next:
1. There are millions of small scale renewable energy systems in Brazil;
2. Small scale renewable energy systems are used for both local self-consumption and grid export;
3. They participate in a totally different scheme from Independent Power Producers, much simpler;
4. There are 2 energy metering systems in small scale renewable energy systems:
a. the DisCo meter
b. the Monitoring Systems that usually are part of the energy generation system, provided by the same manufacturer (e.g. manufacturer ABB provides Aurora Vision, manufacturer SMA provides SMA Energy, …)
5. The DisCos have to follow strict guidelines for their activities, including for the energy metering;
6. The DisCos' meters testing procedures are done by batches, are repeated at least every 5 years;
7. The DisCos are very large companies that attend millions of consumers; their metering procedures have to comply with the national guidelines from ANEEL thus safely reliable, but not accessible by the consumer;
8. For grid export systems, the best energy metering option is the DisCo energy meter, which is consequently used for billing in PPA-similar arrangements;
9. For local self-consumption systems, due to the local instantaneously energy consumption of part of the energy generation, the best energy metering option is the monitoring system of the energy generation system, which is consequently used for billing in PPA-similar arrangements;
10. Both grid export and local self-consumption PPA-similar arrangements usually do not require any kind of calibration certificate.