SANTANA RENEWABLE ENERGY

Document Prepared By Waycarbon Soluções Ambientais e Projetos de Carbono Ltda

1000, Paraíba Street, 7th floor. Belo Horizonte/MG. Brazil

Phone: +55 (31) 3656-0501
E-mail: fbittencourt@waycarbon.com

https://waycarbon.com/

Project Title	Santana Renewable Energy
Version	05
Date of Issue	09 – July - 2020
Prepared By	WayCarbon Soluções Ambientais e Projetos de Carbono Ltda
Contact	Felipe Bittencourt fbittencourt@waycarbon.com +55 (31) 3656-0501 1000, Paraíba Street, 7th floor. Belo Horizonte/MG. Brazil

Table of Contents

1 PROJECT DETAILS

1.1 Summary Description of the Project

Santana Renewable Energy is a Project that consists on the implantation and operation of wind power plants (WPP) in the state of Rio Grande do Norte, Brazil.

Santana Renewable Energy will reduce greenhouse gases (GHG) emissions, avoiding electricity generation from fossil fuels sources. Clean and renewable electricity supply will bring an important contribution to environmental sustainability, reducing the GHG emissions that would occur in the absence of this project. The WPP will supply clean electricity to the Brazilian National Interconnected System (SIN).

The baseline scenario is the same scenario existing before the start of implementation of the project activity, which is: “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, as reflected in the combined margin calculations according to “Tool to calculate the emission factor for an electric system”.

The project activity is called Santana Complex, composed by four Wind Power Plants (WPPs). These WPPs, their installed capacity, main technology employed (numbers and model of wind power turbines (WPTs)), location, and operation starting date are presented in Table 1. The Installed Capacity, number or turbines, individual capacity and WPP location were evidenced by the Energy Production Report issued by AWS Truepower.

The estimated annual average GHG emission reductions is 241,485 tCO2 and total GHG emission reductions for the crediting period is 2,414,849 tCO2.

TABLE 1 - PROJECT ACTIVITY OF SANTANA RENEWABLE ENERGY

WPPs	Specific Purpose Company (SPE)	Installed Capacity (MW)	Main Technology Employed	WPP Location (City/State)	Operation Starting Date[1] (dd/mm/yyyy)
Santana Wind Complex	**-**	**109.2**	**26 WPTs (with 4.2 MW)**	**-**	01/11/2021
Acauã I	Aliança Geração de Energia S.A.	25.2	6 WTPs with 4.2 MW each	Santana do Matos and Tenente Laurentino Cruz/RN	01/11/2021
Acauã II	Aliança Geração de Energia S.A.	21.0	5 WTPs with 4.2 MW each	Santana do Matos/RN	01/11/2021
Acauã III	Aliança Geração de Energia S.A.	16.8	4 WTPs with 4.2 MW each	São Vicente, Lagoa Nova and Santana do Matos/RN	01/11/2021
Baixa do Sítio	Aliança Geração de Energia S.A.	46.2	11 WTPs with 4.2 MW each	São Vicente, Tenente Laurentino Cruz and Santana Do Matos/RN	01/11/2021

1.2 Sectoral Scope and Project Type

The sectoral scope applied is sectoral scope 1 – Energy (Renewable/Non-Renewable). Santana Renewable Energy Project is not a Grouped Project.

1.3 Project Proponent

Table 2 – Project Proponents

Organization name	Aliança Geração de Energia S.A.
Contact person	Wander Luiz de Oliveira
Title	Engineering and Commercialization Director
Address	169. Matias Cardoso Street, 9th floor, Belo Horizonte/MG - Brazil
Telephone	+55 31 21913301
Email	wander.oliveira@aliancaenergia.com.br

[1] Operation starting date of each plant according to the Assembly Minute signed by the shareholders of Aliança Geração de Energia S.A: Vale S.A. and Cemig Geração e Transmissão S.A.

1.4 Other Entities Involved in the Project

WayCarbon, a company specialized in sustainability and climate change, is responsible for analyzing additionality, preparing all necessary documents both for the financial analysis and the Project Description (PD) as well as delivering the PD to the Validation/Verification body according to VCS guidelines and procedures. It is responsible for obtaining, referencing all external parameters presented in this document and for estimating the emission reductions for the whole crediting period.

Organization name	WAYCARBON SOLUÇÕES AMBIENTAIS E PROJETOS DE CARBONO LTDA
Role in the project	Third party Project Description developer
Contact person	Felipe Bittencourt
Title	Director
Address	1000, Paraíba Street, 7th floor. Belo Horizonte/MG. Brazil
Telephone	+55 (31) 3656-0501
Email	fbittencourt@waycarbon.com

1.5 Project Start Date

According to the VCS Standard, version 4.0, the project start date is the date on which the project began generating GHG emission reductions or removals. Therefore, the project start date of Santana Renewable Energy is 01/11/2021 (DD-MM-YYYY) *(Operation Starting Date of the Santana Complex as defined by the Assembly Minute, signed at 13/12/2019 (DD/MM/YYY))*.

1.6 Project Crediting Period

The project crediting period shall be a maximum of ten years which may be renewed at most twice.

The first crediting period of the project will be from 01/11/2021 to 31/10/2031.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Table 3 – Project Scale

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
2021	40,357
2022	241,485
2023	241,485
2024	241,485
2025	241,485
2026	241,485
2027	241,485
2028	241,485
2029	241,485
2030	241,485
2031	201.127
Total estimated ERs	**2,414,849**
Total number of crediting years	**10**
Average annual ERs	**241,485**

1.8 Description of the Project Activity

The project activity is formed by the installation of a greenfield grid-connected renewable energy power generation.

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, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

The clean and renewable electricity delivered to Brazilian Interconnected System by the project provides an important contribution to environmental sustainability by reducing carbon dioxide emissions that otherwise would have occurred in the absence of the project. The project activity reduces GHG emissions avoiding electricity generation from fossil fuel sources, which would be generated (and emitted) in the absence of the project.

The emission reduction provided by the project is calculated according version 19.0 of the Large-Scale Consolidated Methodology ACM0002 – Grid-connected electricity generation from renewable sources (hereafter called ACM0002 Methodology).

Table below shows some technical characteristics of the plants. Installed capacity is evidenced by the Energy Production Report, issued at September 17th of 2019 by AWS Truepower. Plant Load Factor is evidenced by the Energy Production Report, issued on 17/09/2019 (DD-MM-YYYY) by

AWS Truepower. Number of turbines and individual capacity are again presented in Table 4 to summarize technical characteristics. The average lifetime of the equipment is 20 years[2].

Table 4 - Technical Characteristics of Santana Renewable Energy

WPPs	Installed Capacity (MW)	Plant Load Factor (%)	WPTs
Acauã I	25.2	57.57	6 WPTs with 4.2 MW each
Acauã II	21.0	57.57	5 WPTs with 4.2 MW each
Acauã III	16.8	57.57	4 WPTs with 4.2 MW each
Baixa do Sítio	46.2	57.57	11 WPTs with 4.2 MW each

1.9 Project Location

Coordinates of each plant of Santana Complex are presented as follows[3]:

- Acauã I: LAT 6° 06' 01.1'', LONG 36° 39' 30.7'';
- Acauã II: LAT 6° 05' 02.6'', LONG 36° 40' 34.5'';
- Acauã III: LAT 6° 06' 28.7'', LONG 36° 38' 16.9'';
- Baixa do Sítio: LAT 6° 06' 07.2'', LONG 36° 39' 06.2''.

The Wind Power Plants are located at the cities of Santana do Matos, Tenente Laurentino Cruz, São Vicente and Lagoa Nova, state of Rio Grande do Norte, in Brazil.

A KML file was submitted to the VVB (Validation and Verification Body) that will perform validation and verification.

1.10 Conditions Prior to Project Initiation

Santana Renewable Energy activity will install grid-connected greenfield wind power plants in Brazil. All wind power plants (WPPs) will supply clean electricity to the Brazilian National Interconnected System (SIN).

Prior to the implementation of the project activity, no wind power plant was operational in the location where project will be implemented. The baseline scenario is the same as the conditions existing prior to project initiation as described at section 2.4.

[2] ANEEL (2009). Manual de Controle Patrimonial do Setor Elétrico. Annex of Normative Resolution nº 367/2009, 02 June 2009. Available at: http://www.aneel.gov.br/cedoc/aren2009367_2_primeira_Ver.pdf. Last access on November, 2019.
[3] Available in the Preliminary License of each WPP.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The most relevant local laws and regulations related to Santana Renewable Energy are defined by the National Council for the Environment, as per the resolution n. 462, of July 24th of 2014[4], that determines the procedures for the environmental licensing process for energy generation from wind power plants projects on land.

The environmental licensing is a legal obligation prior to the installation of any construction or activity potentially pollutant or degrading to the environment in Brazil. Upon initiating any investment project, Preliminary Licenses of the wind power plants investment should be required and have been obtained by the project. For the construction phase, Installation Licenses will be needed. As such, they have been requested and approval is pending local government evaluation. For the full operation, a final license is emitted upon inspection and clearance (Operation License). Preliminary Licenses of the wind power plants were already emitted, and Installation Licenses were requested. Its number and request date are:

- Acauã I Wind Power Plant: Preliminary License N. 2017-113313/TEC/LP-0094. Installation License Request N. 2019-138370/TEC/LI-0098. Request Date: September 11th of 2019.

- Acauã II Wind Power Plant: Preliminary License. N. 2107-13315/TEC/LP-0095. Installation License Request N. 2019-138371/TEC/LI-0099. Request Date: September 11th of 2019.

- Acauã III Wind Power Plant: Preliminary License. N. 2017-113286/TEC/LP-0087. Installation License Request N. 2019-138366/TEC/LI-0096. Request Date: September 11th of 2019.

- Baixa do Sítio Wind Power Plant: Preliminary License. N. 2017-113298/TEC/LP-0088. Installation License Request N. 2019-138368/TEC/LI-0097. Request Date: September 11th of 2019.

The approval of the National Agency of Electric Energy (ANEEL) is also required, as defined by law n. 9.427[5], of December 26th of 1996 which instituted the National Agency of Electric Energy and its authority. The dispatches for the wind power plants were already emitted. Its number and date of emission are listed as follows:

- Acauã I Wind Power Plant: Dispatch n. 1.242/2019, emitted on April 30th of 2019 and Authoritative Resolution n. 8.757, emitted on April 28th of 2020.

- Acauã II Wind Power Plant: Dispatch n. 1.243/2019, emitted on April 30th of 2019 and Authoritative Resolution n. 8.756, emitted on April 28th of 2020.

- Acauã III Wind Power Plant: Dispatch n. 1.868/2019, emitted on July 2nd of 2019 and Authoritative Resolution n. 8.566, emitted on February 11th of 2020.

[4] National Council for the Environment (CONAMA), resolution n. 462, of July 24th of 2014. Available at: <http://www2.mma.gov.br/port/conama/legiabre.cfm?codlegi=703>. Last access on April 2020.
[5] law n. 9.427, of December 26th of 1996. Available at: < http://www.planalto.gov.br/ccivil_03/leis/l9427cons.htm>. Last access on April, 2020.

- Baixa do Sítio Wind Power Plant: Dispatch n. 1.869/2019, emitted on July 2nd of 2019 and Authoritative Resolution n. 8.755, emitted on April 28th of 2020.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

Santana Renewable Energy project will consist of three SPEs, whose shares (100%) will be held by Aliança Geração de Energia S.A.. The Project's SPEs have not yet been constituted as the investment decision has just recently been confirmed. The four Wind Power Plants that compose the Complex will be grouped as three different SPEs, named Parque Acauã I e II, Parque Baixa do Sítio and Parque Acauã III. Meanwhile, all the process for registering and requesting licenses for the wind power plant is being conducted upon request made by Aliança Geração de Energia S.A.. Therefore, Aliança Geração de Energia S.A. is the sole owner of the project and project proponent.

1.12.2 Emissions Trading Programs and Other Binding Limits

Not applicable. The project is not included in any other emission trading program or mechanism.

1.12.3 Other Forms of Environmental Credit

Not applicable. The project has not sought or received any other form of GHG-related environmental credit, including renewable energy certificate.

1.12.4 Participation under Other GHG Programs

Not applicable. The project was not registered and is not seeking registration under any other GHG programs.

1.12.5 Projects Rejected by Other GHG Programs

Not applicable. The project was not rejected by any other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

Not applicable. The project is not a Grouped Project.

Leakage Management

Not applicable. According ACM0002, no leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

Commercially Sensitive Information

Not applicable. No commercially sensitive information has been excluded from the public version of this project.

Sustainable Development

Santana Renewable Energy contributes to the sustainable development through the promotion of economic growth without compromising future generations, respecting the concept of Sustainable Development established by Brundtland Report, elaborated by the World Commission on Environment and Development. This report defines the term “sustainable development” as “the development that satisfies the present necessities, without compromising the capacity of future generations of supplying their own necessities”.

Through the following actions, Santana Renewable Energy contributes to the sustainable development of its region and country:

- It reduces greenhouse gas emissions ($CO2$) from the Brazilian Interconnected System;
- It generates extra income for landowners, while they can continue using the area for other activities, thus it increases and diversifies the lands productivity;
- Besides generating income for landowners, it stimulates the regional economy by increasing tax revenues for the local government and direct and indirect job opportunities for local workers and service suppliers. The resulting economic stimulus will improve capital stock in the region, which can allow investment in the infrastructure, productive capacity and consequently the satisfaction of the population’s basic needs. Thus, it can promote a virtuous cycle in the local economy;
- The described economic stimulus goes along with a general improvement of the local infrastructure such as road, electricity transmission system and stimulus for education;
- It will use equipment which have domestic content and, therefore, induce the development of national technology and improvement of domestic know-how. By promoting the establishment and growth of the necessary industry equipment and services, the project will contribute to the increasing availability of wind generation technology, which will, consequently, reduce maintenance costs and risks of the technology in the country;
- The project operation requires services from skilled operators and maintenance staff and therefore stimulates the development of a proficient tertiary sector in the region, thus creating opportunities for education, professionalization and employment;
- It is an important complement and diversification to the run-of-river hydroelectric generation. As Brazil’s hydro and wind regimes are largely complementary, their combination allows to partially compensate the lack of hydropower storage capacity with minimal installation of thermal power generation units, while still providing enough energy security based on a portfolio of these complementary renewable sources.

Further Information

Not applicable.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

The methodology applied to the Project is ACM0002: “Grid-connected electricity generation from renewable sources” (version 19.0)[6]. This methodology also refers to the following tools:

a) TOOL01: Methodological tool “Tool for the demonstration and assessment of additionality”, version 07.0.0;

b) TOOL07: Methodological tool “Tool to calculate the emission factor for an electricity system”, version 07.0;

c) TOOL24: Methodological tool “Common Practice”, version 03.1;

d) TOOL27: Methodological tool “Investment Analysis”, version 09.0.

2.2 Applicability of Methodology

In this section, project proponents show how the project activity meets each of the ACM0002 applicability condition: “Grid-connected electricity generation from renewable sources” (version 19.0).

Applicability Condition 01:

ACM0002 methodology is applicable to grid-connected renewable energy power generation project activities that:

a) Install a greenfield power plant;

b) Involve a capacity addition to (an) existing plant(s);

c) Involve a retrofit of (an) existing operating plants/units;

d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or

e) Involve a replacement of (an) existing plant(s)/unit(s).

Santana Renewable Energy is a project that involves greenfield wind power plants. Therefore, option “a” is applied.

[6] Available on the UNFCCC CDM website.

Applicability Condition 02:

The methodology is applicable under the following conditions:

a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;

b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.

Santana Renewable Energy is a project that involves greenfield wind power plants. Therefore, option "a" is applied.

Applicability Condition 03:

In case of hydro power plants, one of the following conditions shall apply:

a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or

b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (3), is greater than 4 W/m^2; or

c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m^2; or

d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m^2, all of the following conditions shall apply:

   i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m^2;

   ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;

   iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be:

      (1) Lower than or equal to 15 MW; and

      (2) Less than 10 per cent of the total installed capacity of integrated hydro power project.

Santana Renewable Energy project activity consists on the implementation of wind power plants. Therefore, this applicability condition is not applied for the project.

<u>Applicability Condition 4:</u>

In the case of integrated hydro power projects, project proponent shall:

a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or

b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.

Santana Renewable Energy project activity consists on the implementation of wind power plants. Therefore, this applicability condition is not applied for the project.

<u>Applicability Condition 5:</u>

The methodology is not applicable to:

a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;

b) Biomass fired power plants/units;

Santana Renewable Energy project activity consists on the implementation of greenfield wind power plants. Therefore, the methodology is applicable to the project.

<u>Applicability Condition to TOOL01: Methodological Tool "Tool for the demonstration and assessment of additionality", version 07.0.0:</u>

The use of the "Tool for the demonstration and assessment of additionality" is not mandatory for project participants when proposing new methodologies. Project participants may propose alternative methods to demonstrate additionality for consideration by the Executive Board. They may also submit revisions to approved methodologies using the additionality tool.

Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.

Considered that the methodology includes the additionality tool, the tool is applicable to the project.

Applicability condition to TOOL07: Methodological Tool "Tool to calculate the emission factor for an electricity system", version 07.0;

Applicability condition 1:

This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).

Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.

The project activity supplies electricity to the grid that results in savings of electricity that would have been provided by the grid. Therefore, the tool is applicable to the project.

Applicability condition 2:

In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.

Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.

The project electricity system is totally located outside an annex I country. Therefore, the tool is applicable to the project.

Applicability condition to TOOL24: Methodological Tool "Common Practice", version 03.1:

This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", or baseline and monitoring methodologies that use the common practice test for the demonstration of additionality.

The project activity applies the methodological tool "Tool for the remonstration and assessment of additionality". Therefore, the tool is applicable to the project activity.

<u>Applicability condition to TOOL27: Methodological Tool "Investment Analysis", version 09.0.</u>

This methodological tool is applicable to project activities that apply the methodological tool "Tool for the demonstration and assessment of additionality", the methodological tool "Combined tool to identify the baseline scenario and demonstrate additionality", the guidelines "Non-binding best practice examples to demonstrate additionality for SSC project activities", or baseline and monitoring methodologies that use the investment analysis for the demonstration of additionality and/or the identification of the baseline scenario.

The project activity applies the methodological tool "Tool for the remonstration and assessment of additionality". Therefore, the tool is applicable to the project activity.

2.3 Project Boundary

Table 5 – Project Boundaries

Source		Gas	Included	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	Not applicable	Not applicable
Project Activity	For dry or flash steam geothermal power plants, emissions of CH4 and CO2 from non-condensable gases contained in geothermal steam	CO_2	No	Not applicable to this project activity
		CH4	No	Not applicable to this project activity
		N2O	No	Not applicable to this project activity
	For binary geothermal power plants, fugitive emissions of CH4 and CO2 from non-condensable gases contained in geothermal steam	CO_2	No	Not applicable to this project activity
		CH_4	No	Not applicable to this project activity
		N_2O	No	Not applicable to this project activity

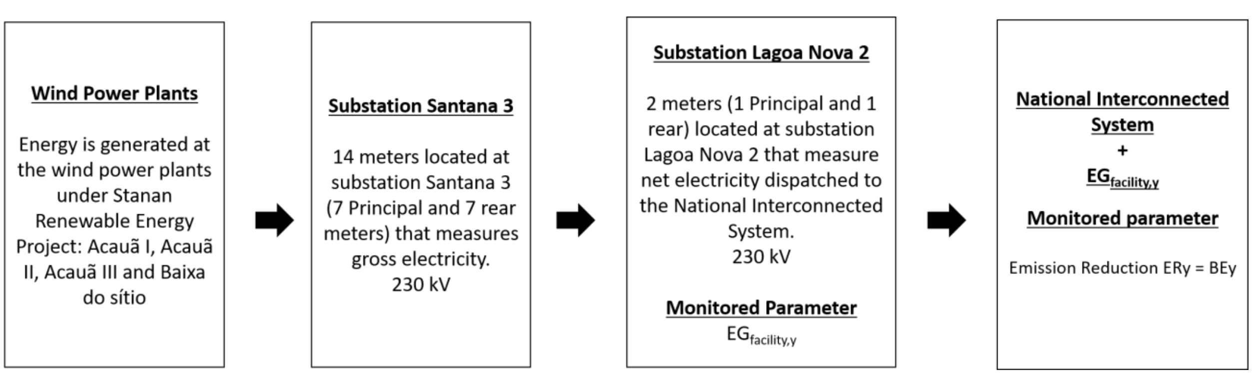
Source		Gas	Included	Justification/Explanation
	For binary geothermal power plants, fugitive emissions of hydrocarbons such as n-butane and isopentane (working fluid) contained in the heat exchangers	Low GWP hydrocarbon/ refrigerant	No	Not applicable to this project activity
	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	Not applicable to this project activity
		CH_4	No	Not applicable to this project activity
		N_2O	No	Not applicable to this project activity
	For hydro power plants, emissions of CH4 from the reservoir	CO_2	No	Not applicable to this project activity
		CH_4	No	Not applicable to this project activity
		N_2O	No	Not applicable to this project activity

The spatial extent of the project boundary includes Santana's wind power plants, Substation Santana 3 and Substation Lagoa Nova 2, where project activity is conducted.

Energy is generated by Wind Power Plants under Santana Renewable Energy, which is directly connected to Substation Santana 3, where gross electricity is measured. The energy is then directed to Substation Lagoa Nova 2, where electricity is dispatched to the National Interconnected System. The substation Lagoa Nova 2 meters measure net electricity delivered to the grid.

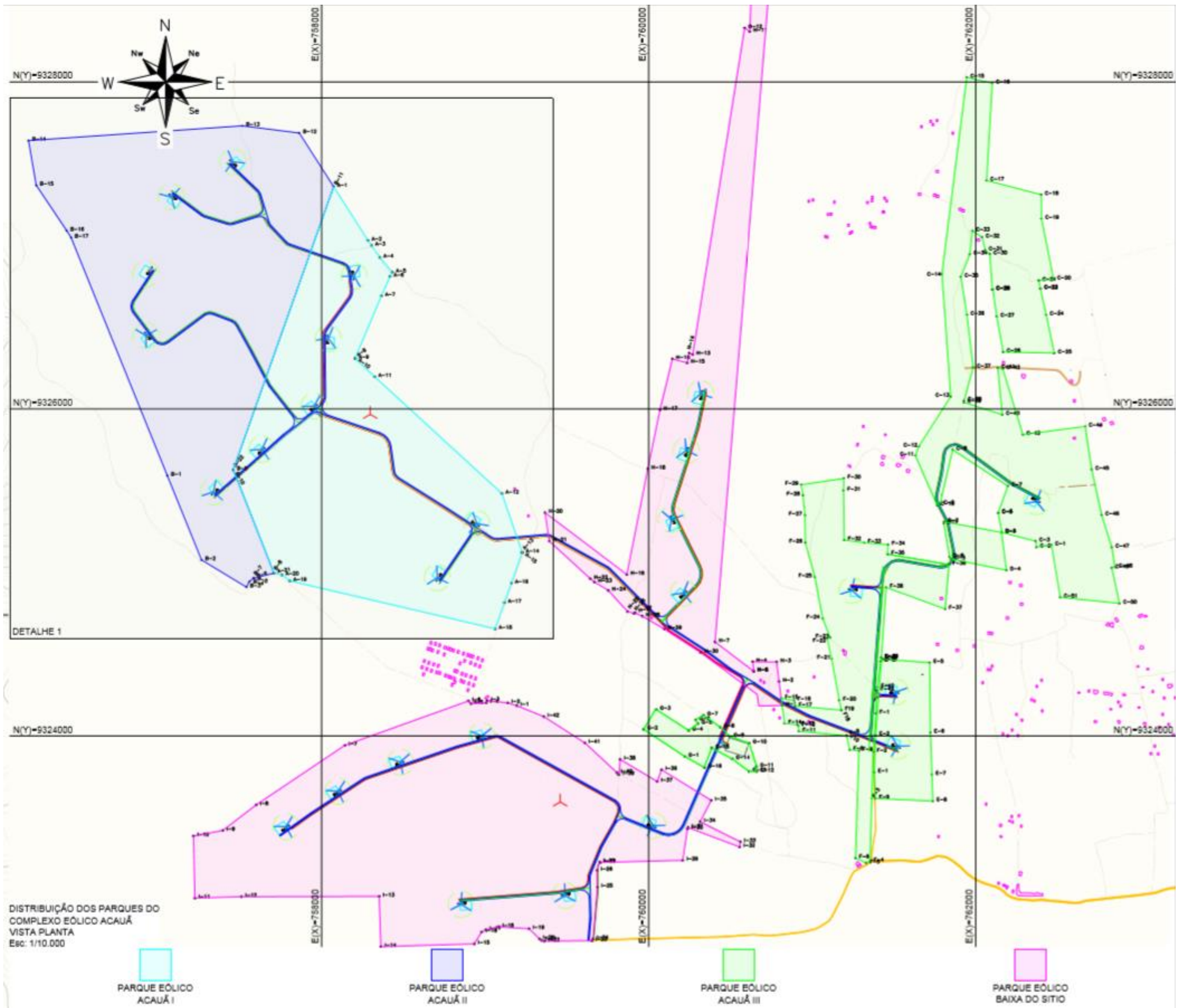
Operation and Maintenance (O&M) team is responsible for measurement activities. It collects and stores all measurement data. They are also responsible for analysing $EG_{facility,y}$. information. The team monitors data provided by the meters and cross-checks it with information provided by Electricity Commercialization Chamber (CCEE).

The diagram below shows the physical locations of the various installations and management activities taking place as part of the project. Black arrows represent the energy flow.



There are no GHG emission sources in the project boundary nor are considered leakage emissions. Therefore, the emission reduction is equivalent to baseline emissions.

The following image shows the installations of the Santana Renewable Energy Project, located in the cities of Santana do Matos, Tenente Laurentino Cruz, São Vicente and Lagoa Nova, in Rio Grande do Norte state. The areas marked under dark blue, light blue, pink and green correspond to the Acauã I, Acauã II, Acauã III and Baixa do Sítio WPPs respectively.



2.4 Baseline Scenario

Since the project activity is the installation of greenfield power plants, the baseline scenario 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, as reflected in the combined margin (CM) calculations described in “TOOL07: Tool to calculate the emission factor for an electricity system” (version 7.0).

2.5 Additionality

The demonstration of additionality follows the CDM TOOL01 “Tool for the demonstration and assessment of additionality”, version 07.0.0.

The tool provides a stepwise approach to demonstrate and assess the additionality of a project activity.

These steps are:

• Step 0: Demonstration whether the proposed project activity is the first-of-its-kind;

• Step 1: Identification of alternatives to the project activity;

• Step 2: Investment analysis;

• Step 3: Barriers analysis; and

• Step 4: Common practice analysis

Step 0. Demonstration whether the proposed project activity is the first-of-its-kind

This is step is not applied once the proposed project activity is not the first-of-its-kind.

Step 1. Identification of alternatives to the project activity consistent with current laws and

Regulations

Define realistic and credible alternatives to the project activity(s) through the following Sub-steps:

Sub-step 1a. Define alternatives to the project activity:

The realistic alternatives to the project activity are:

(a) P1: The project activity not implemented as a VCS project;

(b) P2: The continuation of the current situation, that is to use all power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance. The additional power generated under the project would be generated in existing and new grid-connected power plants in the electricity system; and

Sub-step 1b. Consistency with mandatory laws and regulations:

The Brazilian Regulatory Framework provides autonomy to the economic agents about the investments to be done in the electric sector. Both scenarios identified are in compliance with mandatory legislation and regulations.

A brief description of Brazilian Regulatory is presented in this section:

The Brazilian Regulatory Framework went through important structural and conceptual changes over the past 2 decades, resulting in three different electricity regulatory models: the state-based model (until 1995); the free market model (1995 to 2003) and the new model, implemented in 2004 and valid up to date. Under the state-owned model, the energy sector was dominated by almost exclusively state-owned and verticalized companies that covered the segments of generation, transmission and distribution. During the period of state monopoly, the major part of the currently existing generation capacity has been built, mostly consisting of large hydropower plants with important energy reservation capacity.

From 1995 on, due to lack of capacity to further finance the necessary investments for the expansion in energy generation, transmission and distribution, the government initiated a partial privatization process, structured by four main pillars: i) creation of a competitive environment (free market), with a gradual elimination of the captive consumers; ii) partial dismantling of the state owned verticalized companies by dividing and privatizing the segments of generation, transmission and distribution; iii) allowing free access to the transmission lines for generators and consumers; and iv) placing the operation and planning responsibilities to the private sector[7].

The adoption of the free market model allowed the participation of private entities and the implementation of the Concession Law (Law No 8,987 of February 13, 1995) and promoted the construction of some renewable plants in Brazil.

Unfortunately, the model did not provide the investment in generation capacity needed to satisfy the growing demand and it resulted in an energy crisis in 2001, when energy consumption of consumers and industry was rationed, and Brazil's economic development was badly hit. As a response to this crisis, a new regulatory framework was put in place in 2004, resulting in a more active role of Brazil's government by virtually suspending the privatization process initiated in the 1990's and centralizing the functions of electricity planning at national government level,[5] while promoting private sector investments to fund the required expansion in generation capacity. This new regulatory model provided a more efficient mechanism of power procurement between generators and distributors, primarily by creating two parallel electricity trading environments: the Regulated Contracting Environment, referred to as ACR (*Ambiente de Contratação Regulada*), where energy is finally contracted based on the lowest tariffs defined by a regulated auctioning

[7] Aguiar F.L. Modelo Institucional do Setor Elétrico Brasiliero, 2007, available at https://www.realestate.br/dash/uploads/sistema/images/File/arquivosPDF/DST_FernandoAguiar.pdf , last access on Nov. 4th, 2019.

process, and the Free Contracting Environment, referred to as ACL, or *Ambiente de Contratação Livre* (ACL).

As mentioned previously, economic agents are free to decide about the investments to be done in the electric sector, respecting Regulatory framework. Therefore, it does not exist either restrictions nor impositions to the project activity and to its alternatives. Alternatives to the project activity (P1 and P2) are plausible and consistent with mandatory laws and regulations.

Step 2. Investment analysis

According to the "Tool for the demonstration and assessment of additionality", project participants shall determine whether the proposed project activity is not:

- The most economically attractive or financially;
- Economically or financially feasible, without the revenue from the sale of Verified Carbon Units (VCUs).

The investment analysis follows the CDM "Methodological tool Investment analysis", version 09.0.

To conduct the investment analysis, the following steps must be used:

Sub-step 2a. Determine appropriate analysis method

In order to determine the appropriate analysis method, the following options are available to be used in the additionality analysis:

- Option I - Apply simple cost analysis;
- Option II - Apply investment comparison analysis;
- Option III - Apply benchmark analysis.

According to the tool, if the project activity and the alternatives identified in Step 1 generate financial or economic benefits other than carbon credits related income, then the investment comparison analysis (Option II) or the benchmark analysis (Option III) shall be used. The benchmark analysis will be applied, because it is the most appropriated for this type of activity in Brazil. Moreover, the Option II shall be applied when there are credible alternative scenarios existed to the project activity. As there are no alternative to compare with the project's indicator (Internal Rate of Return) the Option III shall be applied.

Therefore, the Option III was chosen.

Sub-step 2b – Option III. Apply benchmark analysis

<u>Financial indicator identification</u>

Project's Internal Return Rate (IRR) is selected as an appropriated financial indicator. The cash flow was performed in real terms, i.e. without considering the impact of inflation, and after payment of taxes. The resulting financial indicator therefore is a post-tax project IRR given in real terms and therefore compatible with the benchmark defined in the following lines.

The project IRR calculation follows what it is indicated by the CDM “Methodological Tool Investment Analysis”, version 09.0.

The IRR calculation is carried out by considering all four wind farms as a single one (and in individual basis for each one of the wind farms). This approach is more realistic and conservative once the four wind farms are located in adjoining sites and were developed considering several synergies that in a standalone basis are not feasible. The terms and conditions, including values for CAPEX and OPEX, were positively affected by the fact that Aliança Geração de Energia S.A. planned and structured a project of a higher Installed capacity, instead of the lower individual capacity of each WPP[8].

Benchmark identification.

According to the Investment Analysis Methodological tool (TOOL27), version 09.0, one appropriate benchmark to a project IRR is the estimation of the Weighted Average Capital Cost (WACC). This is a rate used to discount cash flows and it takes into consideration the cost of debt and the cost of equity of a typical investor in the sector of the Project Activity.

Therefore, the WACC is calculated through the formula below:

WACC = Re x We + Rd x Wd x (1-Tc)

Where:

Re Cost of equity (-);

We Percentage of financing that is equity (-);

Rd Cost of debt (-);

Wd Percentage of financing that is debt (-);

Tc Corporate tax rate (-);

- **Cost of equity (Re):**

The average cost of equity is calculated using Capital Asset Pricing Model (CAPM). This is a valid methodology for markets where financial instruments are liquid, indicating that currently traded

[8] Brazil has specific rules for the commercialization of energy and some incentives for renewable sources, which may imply a structural modelling of the WPP. For example, there is a discount applied to the transmission and distribution system usage tariffs for renewable generating units and this discount had a power limitation of up to 30 MW by 2015, which caused large wind projects to be split into small power plants of 30 MW.

papers represent a valid reference of market conditions. There is significant evidence of such liquidity in the Brazilian market, as listed below:

- In TOOL27 (version 09.0), paragraph 20, some conditions that commonly show liquidity are present. Conditions a, b, c and e are met by all countries identified in the annex, which is the case for Brazil (page 13);

- The Brazilian Exchange (B3) data were analysed to assure that condition d was met.

As a result of the assessment, it was determined that there are more than three pure players that belong to the same sector of the project activity, with at least 3 years of daily stock market data. The players are: Cemig, Cia Paraense de Energia (COPEL), Centrais Elétricas do Brasil S.A. (ELETROBRÁS), EDP Energias do Brasil S.A., Transmissora Aliança de Energia Elétrica S.A. (TAESA), Light S.A. and Aes Tietê Energia S.A.. The data can be accessed through B3 website.[9]

The Project Description was updated to better inform that condition d, required as per TOOL27, paragraph 20, is met. Detailed spreadsheets presenting all the data used to arrive at such conclusion was provided to the VVB.- Several market analyses involving publicly traded companies use CAPM as a methodology for equity cost calculation[10] (e.g.: Drogasil Raia, EDP, Braskem, Natura, Energisa, Gerdau) denoting its widely adopted practice.

The cost of equity (Re) is calculated through the formula below, as per paragraph 21 of TOOL27:

Re= Rf + Beta x (Rm - Rf)

Where:

Re	Cost of equity (expected return on equity);
Rf	Risk free rate;
Beta	Adjustment factor to reflect the risk of projects. This value corresponds to the average beta of energy companies in emergent countries, leveraged to the capital structure of the project activity;

[9] Registration of Stock Market Data, B3. Available at: <http://www.b3.com.br/pt_br/market-data-e-indices/servicos-de-dados/market-data/historico/mercado-a-vista/cotacoes-historicas/>. Last access on May 8th of 2020.
Codes for the company names on the project activity sector, B3. Available at: <http://bvmf.bmfbovespa.com.br/cias-listadas/empresas-listadas/BuscaEmpresaListada.aspx?segmento=Energia+El%c3%a9trica&idioma=pt-br>. Last access on May 8th of 2020

[10]
https://www.rd.com.br/Download.aspx?Arquivo=rBrVhKSQ4tNb5bV9hx/4ng==,
http://ri.edp.com.br/ptb/7851/607448.pdf,
http://www.braskem-ri.com.br/download/RI/21543,
https://natu.infoinvest.com.br/enu/5019/Aesop_RelatorioNatura_FINAL.pdf,
https://ri.energisa.com.br/ptb/7951/589555.pdf,
http://ri.gerdau.com/ptb/7556/Anexo%203%20-%20Laudo%20de%20Avaliao.pdf
Last access on November, 2019.

Rm Expected Market Return;

- Risk-Free Rate

- In this project activity, the risk free rate corresponds to the average rate of Brazilian Treasury Note, series B (NTN - B) with a maturity of 27 years (NTN-B Principal 150545) for 2018[11], the previous year of the investment decision (considered as the date of the Assembly minute: 13/12/2019 (DD/MM//YYYY). This value, in real terms, corresponds to 5.43%. It is the mean from the data published for the "Buy Tax - Morning" in 2018. Beta

For Beta establishment was consulted A. Damodaran reference available for Power Companies in Emergent countries in 2017.The average unlevered beta corresponds to 0.59[12]. This value was levered for the proposed project activity capital structure trough the formula[13]:

Beta unlevered = Beta levered / (1+ D/E x (1-T)), where:

D= Debt;

E= Equity;

T= Interest and taxes

As per TOOL27, paragraph 26, "If the benchmark is based on parameters that are standard in the market, then the typical debt/equity finance structure observed in the sector of the country should be used. If such information is not readily available, 50 per cent debt and 50 per cent equity financing may be assumed as a default". According to the parameters that are standard in the Brazilian market and to the Sebrae Assessment on the Value Chain of Wind Energy in Brazil[14], the value applied for the Wd and We cost is 70%/30%. So, Debt (D) is equal to 70% and Equity (E) is equal to 30%. This approach is considered conservative, given a 50/50 approach would result on a higher IRR benchmark, of 9,97%.

[11] According to the TOOL27 (Investment analysis, version 09.0), the risk free rates should be based on local sovereign debt and should have a maturity date close to the Project lifetime (at least 10 years) and sufficient liquidity. This parameter with a maturity of 27 years (NTN-B Principal 150545) was obtained at the National Treasure website: <http://www.tesouro.gov.br/-/balanco-e-estatisticas> Furthermore, TOOL27 recommends the adoption of the latest sovereign debt data available at the time of the investment decision. For this reason, the NTN-B of 2017 was selected (the previous year of the investment decision of the project activity). Last access on November 2019.

[12] Available at: <http://pages.stern.nyu.edu/~adamodar/New_Home_Page/dataarchived.html >. Year: 2017, Discount Rate Estimation, Levered and Unlevered Betas by Industry, Emergent Countries, 1/18, Industry Group: Power. Average Beta results in 0.59. Last access on November 2019.

[13]Available at: <https://web.bndes.gov.br/bib/jspui/bitstream/1408/10954/2/RB%2025%20Custo%20de%20Capital%20de%20Distribuição%20de%20Energia%20Elétrica%20-%20Revisão%20Tarifária%202007-2009_P_BD.pdf>. Last access on November 2019.

[14] Value Chain of Wind Energy in Brazil, Sebrae. Available at: <https://bibliotecas.sebrae.com.br/chronus/ARQUIVOS_CHRONUS/bds/bds.nsf/1188c835f8e432ddd43bc39d27853478/$File/9960.pdf>. Last Access on May 8th 2020.

The interest and taxes (T) were considered zero because the Decree nº3,000 of 2009 establishes that from 01/01/1998 it is forbidden any deduction of taxes incentives from the income tax calculated on the basis of presumed profit. Therefore, the corporate tax rate (Tc) will be zero and there will be no tax benefits for indebtedness.

Although the cash flow was performed for the entire Santana Wind Complex, the 4 WPPs that composed it are configured as different SPEs in order to achieve some tariff incentives granted by the Brazilian government. So, the individual revenues of the 4 WPPs are under seventy-eight million Reais per year and for this reason the presumed profit regime (*lucro presumido* in Portuguese) was adopted (Law no. 12.814/2013).

So,

Beta levered= 0.59 x (1+ 70%/30% x (1-0))

= 1.97

- Expected Market Return – Risk-free rate

According to the survey "Market Risk Premium and Risk-Free Rate used for 59 countries in 2018", the difference between the expected market return and the risk-free rate corresponds to the BR Premium, identified at page 7. Value to be applied: 8.40%[15].

Therefore,

Re = 5.43% + 1.97 x 8.40%

= 21.95%

So, **Re in real terms is equal to 21.95%** and this value was considered in WACC calculation.

- **Percentage of financing that is equity (We) and Percentage of financing that is debt (Wd):**

According to the Investment Analysis Methodological Tool (version 09.0), paragraph 26, “if the benchmark is based on parameters that are standard in the market, then the typical debt/equity finance structure observed in the sector of the country should be used”. In Brazil, in the power sector it is usually adopted a 70%/30% finance structure.

Therefore, the percentage of Equity Financing (We) and the percentage of Financing that is debt (Wd) in the WACC calculation were considered **30%** and **70%** respectively.

- **Cost of debt (Rd):**

[15] FERNANDES, Pablo; et. Al. Market Risk Premium and Risk-Free Rate used for 59 countries in 2018. Apr. 23th 2018. Available at: <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3155709>. Last access on November, 2019.

As per TOOL27, paragraph 24, "If the benchmark is based on parameters that are standard in the market, the cost of debt should be calculated as the cost of financing in the capital markets (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on documented evidence from financial institutions with regard to the cost of debt financing of comparable projects. In cases where such data is not available, use the commercial lending rate in the host country to calculate the cost of debt.". Therefore, the cost of debt was calculated as the cost of financing in the capital markets, based on financial institutions.

The cost of debt (Rd) corresponds to the sum of the financial cost with the basic and risk spreads. Therefore, it can be calculated through the formula below:

Total Financing Cost = Financing Cost + Basic Spread + Credit Spread Risk

In Brazil, the National Bank for Economic and Social Development, known as BNDES [16] (in Portuguese, *Banco Nacional de Desenvolvimento Econômico e Social*), provides long-term financing for private sector investments, usually in infrastructure projects. Thereby, it plays an important role in the implementation of the governmental policies for economic development.

As the Investment Analysis Methodological Tool (TOOL27), version 09.0, recommends the use of a long-term debt, it was adopted in this report the **financing cost** as the average value of the long rate terms (TLP) of BNDES for the year of the investment decision of the project activity (2018).

The average value for TLP for 2019 is equal to 2.57%[17], expressed in real terms.

Basic spread and **Credit Risk Spread** are also provided by BNDES[18]. For the energy auctions that occurred in 2018, basic spread was equal to 1.3%. Credit spread risk, in its turn, was up 2.87%, for energy auctions that occurred in April 2015 and April 2016. Data about spread risk for the auction that occurred on 2018 was not available. For conservativeness, the average value of the known spread was considered: 1.44%. Furthermore, on May 2018, BNDES published an article[19], which states the approval of the reduction on the spread risk by 25%-50%. Based on this information, a 50% reduction on the average known value was applied, leading to a final: 0.72%.

Thereby, Rd is defined as:

Rd= Financing cost + Basic Spread + Credit Spread Risk

[16] BNDES is a federal bank that finances long terms investments in all segments of the Brazilian economy, including renewable energy sector. For more details, please see < https://www.bndes.gov.br/wps/portal/site/home >. Last access on November, 2019.

[17] Available at <https://www.bndes.gov.br/wps/portal/site/home/financiamento/guia/custos-financeiros/tlp-taxa-de-longo-prazo>. TLP average value between January and October 2019: 2,57%.

[18] BNDES parameters for energy auction of April, 2015, April, 2016 and 2018. Available at <https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/leiloes-infraestrutura/leiloes-geracao-energia-abril-2015>, <https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/leiloes-infraestrutura/leilao-geracao-2016> and < https://www.bndes.gov.br/wps/portal/site/home/financiamento/produto/leiloes-infraestrutura/leilao-geracao-2018>. Last access: Oct. 2019.

[19] BNDES. BNDES promove nova redução de spread de custos financeiros. Available at: <https://www.bndes.gov.br/wps/portal/site/home/imprensa/noticias/conteudo/bndes-promove-nova-reducao-de-spreads-e-de-custo-dos-financiamentos>. Last access: Oct. 2019

Rd= 2.57% + 1.3% + 0.72%

Rd= 4.59%

- **Corporate tax rate (Tc):**

As a presumed profit was adopted for the WPPs investment analysis, the Corporate Tax Rate (Tc) was considered zero in the WACC calculation. If real profit was adopted, Tc should be equal to 34%. The tax regime was selected according to Law n. 12,814/2013 that establishes that corporate entities revenues under seventy-eight million Reais per year can adopt presumed profit instead of real profit.

Although the cash flow has been made considering the Complex approach, the 4 WPPs are configured as different SPEs. Thereby, the individual revenues of the 4 WPPs are under seventy-eight million Reais per year and for this reason the presumed profit regime (*lucro presumido* in Portuguese) was adopted (Law no.12.814/2013). The sum of the costs and revenues of each WPP is equivalent to the costs and revenues of the complex considered in the proposed report.

Considering all the parameters exposed, the WACC calculation corresponds to 9.80%, as can be demonstrated below:

WACC = Re x We + Rd x Wd x (1-Tc),

= 21.95% x 30% + 4.59% x 70% x (1-0)

= 9.80%

Sub-step 2c. Calculation and comparison of financial indicators

Input parameters used in the investment analysis, together with a description of how the values for these parameters were obtained, are presented in this section.

All negotiations projections for the project (CAPEX and OPEX) considered all four wind power plants together as a complex. Following this strategy, project owners could obtain synergy and scale. Consequently, the project could reach better (lower) prices for CAPEX and OPEX. For VCS additionality analysis, the financial analysis was carried out considering the complex. This is a conservative approach once it assumes lower costs and scale obtained.

The cash flow of Santana Complex is fully presented to the VBB (Validation and Verification Body) that will perform validation and to any entity linked to the VCS that request it for proving the project additionality.

Before presenting the main inputs taken into consideration in the equity cash flow, it is important to describe some comments on the assumptions adopted in the investment analysis that considered orientations of the CDM Executive Board (EB).

General Features of the Investment Analysis and calculation of the Financial Indicator

- **Assessment Period:** The cash flow considers an economic plant lifetime of 20 years which is in line with the operational lifetime of the wind turbines. This agrees with the provisions of the CDM Methodological Tool Investment Analysis, version 09.0. item 6, which defines that the IRR calculation must preferably reflect the expected operational lifetime of the project activity.

- **The value of the assets of the project activity at the end of the assessment period:** As the assessment period covers the whole 20 year expected operational lifetime of the project, no residual value should be considered.

- **Depreciation:** the period of the main asset (aerogenerator) depreciation is 20 years according to guidance from the Manual of Power Sector Asset Control (*Manual de Controle Patrimonial do Setor Elétrico*, page 217), published by ANEEL[20]. Because it is an accounting item which does not involve disbursements, depreciation was not considered for purposes of project IRR calculation.

- **Financial Analysis:** Financial analysis is presented for Santana Complex.

- **Project IRR Calculation:** The purpose of the project IRR calculation is to determine the viability of the project to service debt. Aligned with item 14 of the CDM Methodological Tool Investment Analysis, version 09.0, the cost of financing expenditures shall not be included in the calculation of project IRR in order to avoid double count of financing cost.

- **Operational Starting Date:** The cash flow considered the operation start date of the individual plants as presented at Table 1.

- **Nature of the Cash Flow:** The project cash flow has been performed in real terms, i.e. without considering the impact of inflation.

Sectoral Policies E-

In its twenty second meeting and referring to its decisions from EB 16 (CDM Executive Board Meeting 16), the CDM Executive Board reaffirmed that national and/or sectoral policies and circumstances are to be taken into account on the establishment of a baseline scenario, without creating perverse incentives that may impact host Parties' contributions to the ultimate objective of the Convention. Accordingly, the Board agreed to define E- policy as:

"National and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies (e.g. public subsidies to promote the diffusion of renewable energy or to finance energy efficiency programs)"

Further the Board agreed that such policies should be addressed as follows:

---

[20] Source: ANEEL (2015). Manual de Controle Patrimonial do Setor Elétrico. Annex of Normative Resolution nº 674/2015, August 11th, 2015. Available at: <https://www.aneel.gov.br/documents/656815/14887121/MANUAL+DE+CONTROLE+PATRIMONIAL+DO+SETOR+EL%C3%89TRICO+-+MCPSE/3308b7e2-649e-4cf3-8fff-3e78ddeba98b>. Last access on November, 2019.
.

E- Policies *"that have been implemented since the adoption by the COP of the CDM M&P (decision 17/CP.7, 11 November 2001) need not be taken into account in developing a baseline scenario (i.e. the baseline scenario could refer to a hypothetical situation without the national and/or sectoral policies or regulations being in place).*

Accordingly, the Additionality Tool includes a footnote to the calculation of financial indicators in investment analysis which states that the inclusion of subsidies in investment analysis is subject to the guidance on such policies.

The importance of this concept has been reinforced by the CMP 5 in Copenhagen affirmed that *"it is the prerogative of the host country to decide on design and implementation of policies to promote low greenhouse gas emitting technologies;* and *the Executive Board shall ensure that its rules and guidelines do not create perverse incentives for emission reduction efforts.*

Some current Brazilian energy regulations effectively offer a set of regulatory and economic incentives that aim at promoting renewable electricity sources to guarantee country's electricity expansion based on renewable and low carbon emitting technologies.

The existence of these incentives requires their adequate treatment in the additionality assessment and specifically in the investment analysis. For this purpose, the following paragraphs identify and discuss the relevant regulations and define their treatment according to the rules and principles defined by EB 22.

Policy E-: Reduction of the Distribution/Transmission Fee (TUSD/TUST-G) for Complementary Renewable Energy sources.

Through Resolution N°745, of 22 November 2016[21], ANEEL established a discount of 50% of the applicable distribution/transmission fee (TUSD/TUST-G) for complementary renewable energy projects, such as wind power generation projects, with installed capacity injected in the grid between 30,000 kW and 300,000 kW.

This sectoral policy was established on 22 Nov 2016, and therefore after 11 November 2001. Thus, it represents a "*comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies"* and classifies as E- policy. Accordingly, the incentive shall not be considered for the baseline scenario and the investment analysis, taking into consideration the "*hypothetical situation without the national and/or sectoral policies or regulations being in place".*

Policy E-: Exemption of ICMS and IPI on WTG contracts

IPI stands for a tax over industrialized products and ICMS a tax for circulation of goods and services. Since 2009 the federal government agreed to exempt wind turbines from paying these taxes (CONVÊNIO ICMS 101/97)[22]. Considering that this policy is specific for wind turbines, or

[21] ANEEL (2016). Normative Resolution n° 745, 22 November 2016. Available at: https://www2.aneel.gov.br/aplicacoes/audiencia/arquivo/2016/038/resultado/ren2016745.pdf. Last accessed: Oct 2019.

[22] CONVÊNIO ICMS 101/97. Available at < http://app1.sefaz.mt.gov.br/sistema/legislacao/legislacaotribut.nsf/07fa81bed2760c6b84256710004d3940/f219de0bc8dbf2ce832567940040cc22?OpenDocument>. Last accessed: November, 2019.

rather, the policy creates incentives for less GHG emission intensive technology (Type E- policy). So, the exemption of these taxes was not considered in the cashflow.

Assumptions used in the Cash Flow

After discussion about some assumptions according to CDM "Methodological tool Investment analysis", version 09.0., the inputs used in the project cash flow are presented below:

Table 7 - Financial Assumptions

Item	Description	Unit	Values
Installed Capacity	Installed Capacity, as evidenced by the Energy Production Report.	MW	**109.2**
Electricity generated for sale	It was considered the electricity generated for sale supplied by the Energy Production Report.	MWh/year	**550,669**
Plant Load Factor	It was considered the electricity generated for sale supplied by the Energy Production Report.	%	**57.57**
Electricity Price	It was considered the average electricity price for the PPAs between Aliança Geração de Energia S.A. and Vale S.A. and Cemig Geração e Transmissão S.A. endorsed by the Assembly meeting.	R$/MWh	**154.98**

Investment and Operational Costs			
Item	**Description**	**Unit**	**Values**
Investment (CAPEX)	It was considered the WTG quotation from WEG, and the Proposal for Deliberation of Management Board n.35/2019..	R$	**645,504,557.53**
O&M Costs	It was considered the WTG quotation from WEG, and the Proposal for Deliberation of Management Board n.35/2019.	R$/year	**8,179,773.58**
Other Operational Expenses	It was considered Contracts for landlease, TUST and TFSEE for a similar project and the Proposal for Deliberation of Management Board n.35/2019.	R$/year	**13,464,303.80**

Taxes			
Item	**Description**	**Unit**	**Values**
PIS/COFINS	Budgeted as applicable Brazilian Law 10,637, Law 10,833 and Normative Instruction 247.	%	3.65 (Over Gross Revenue)
CSLL	Budgeted as applicable Brazilian Law 9,249 and Law 9,431	%	9.00 (Over 12% of the Gross Revenue)
IRPJ	Budgeted as applicable Brazilian Law 9,249 and Law 9,430 (up to income = R$ 240,000)	%	15.00 (Over 8% of the Gross Revenue)
IRPJ Additional	Budgeted as applicable Brazilian Law 9,249 and Law 9,430 (income > R$ 240,000)	%	10.00 (Over the income above R$240,000)

Investment analysis results

The Project Internal Rate of Return, in real terms, resulting of the cash flow based on the assumptions is presented in the table below:

Table 8 - Project Indicators X Benchmark

Project IRR	Benchmark (WACC)
6.15%	9.80%

The investment analysis was conducted according to option III of the "Tool for the demonstration and assessment of additionality" and the result shows that project's financial indicator is less favourable than the benchmark. Consequently, it can be concluded, that the project activity cannot be considered as financially attractive.

Sub-step 2d. Sensitivity analysis

The main variables that can affect the project's finances are (i) revenues of the project; (ii) CAPEX and (iii) O&M costs.

The sensitivity analysis considers only those scenarios that contribute to increase economic and financial attractiveness of the project aiming to confirm how solid the analysis of sub-steps 2b and 2c are. Table below presents how changes in the main parameters affect project IRR.

Table 9 – Sensitivity Analysis

	Variation	IRR	To IRR= Benchmark
Revenues increase	10%	7.76%	23.57%
CAPEX reduction	10%	7.45%	-24.61%
O&M costs decrease	10%	6.59%	88.28%

Discussion about likelihood of each scenario is presented as follows.

Project Revenues:

The wind power project's revenue depends solely on two factors: the electricity generated and the electricity sales price, which will be discussed individually. They are in effect related, once uncertainties and variations in the electricity generation have an impact on the commercial conditions, electricity pricing and thus revenues and fines.

Electricity of the project's plants price was settled as defined by the Assembly of shareholders of Aliança Geração de Energia S.A., with whom the Power Purchase Agreements (PPAs) will be executed.

When compared to the last three public auctions (28th, 29th and 30th auctions) and the price practiced at the market, the electricity price for the project is conservative. The auctions present an average price of R$ 90.45, R$ 79.99 and R$ 98.89 respectively for wind energy[23].

All the energy generated by the project will be sold for Vale and Cemig, the sole two shareholders of Aliança Geração de Energia S.A., through Power Purchase Agreements. Therefore, variation on price is not expected.

With regards to the volume of energy generated, the project is subject to significant variations and uncertainties. The quantity of electricity sold is very close to plant load factors of the plants. To reach the benchmarking would be necessary an increase of 23.57% of the electricity generated. It is noticed that the scenario of revenue generation over 10% predicted in the sensitivity analysis is not likely to happen.

According to the generation monitoring reports, published by Brazil's National Interconnected System Operator[24] (Operador Nacional do Sistema Elétrico – ONS), the average deviation from the electricity expected (based on plant load factors) and real electricity generated of all plants of the North-eastern Submarket of the Brazilian interconnected System is 5.44%, for the period of October 2018 to September 2019.

It is also important to consider that this deviation can vary according to local geomorphologic factors, seasonal factors, and between years. Furthermore, to commercialize the generated electricity surplus, contractual clauses must be respected, and it may not imply on a corresponding increase on the revenue. Hence, it is worth noting that even the scenario of revenue generation increase of 10% in the sensitivity analysis is unlikely to be maintained for such a long period.

[23] At the website: <https://www.ccee.org.br/portal/faces/oquefazemos_menu_lateral/leiloes?_adf.ctrl-state=f243xypm8_1&_afrLoop=154332466852759#!%40%40%3F_afrLoop%3D154332466852759%26_adf.ctrl-state%3Df243xypm8_5>, please, see at "resultados", the results for the 28th, 29th and 30th public auctions.

[24] ONS Report "Boletim Mensal de Geração Eólica". From October 2018 to September 2019, available at:
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_Eolica-set_2019.pdf>
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_Eolica_ago2019.pdf>
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim%20Mensal%20de%20Gera%C3%A7%C3%A3o%20E%C3%B3lica%202019-07.pdf>
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim%20Mensal%20de%20Gera%C3%A7%C3%A3o%20E%C3%B3lica%202019-06.pdf>
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim%20Mensal%20de%20Geração%20Eólica%202019-05.pdf>.
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim%20Mensal%20de%20Gera%C3%A7%C3%A3o%20E%C3%B3lica%202019-04.pdf>.
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_Eolica_mar%C3%A7o_%202019.pdf>.
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_%20E%C3%B3lica_fev_%202019.pdf>.
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_E%C3%B3lica_jan_2019.pdf>.
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_Eolica_dez_2018.pdf>.
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_Eolica_nov_%202018.pdf>.
<http://www.ons.org.br/AcervoDigitalDocumentosEPublicacoes/Boletim_Eolica_out_2018.pdf>.
Last access: October 29th, 2019.

CAPEX

CAPEX represents the most important investment of the enterprise. At the time of this VCS Project Description, the major components of the CAPEX were already budgeted.

The project proponent is a reference institution for the energy sector. Created in 2015, Aliança Energia was co-founded by Vale and Cemig Group. Vale is a global enterprise, present in 30 countries, with activities on mining, logistics, energy and others. Cemig Group is seen as one of the most important groups in the country for the energy sector, participating in over 200 societies and consortiums[25].

An eventual CAPEX reduction scenario is possible. However, given the experience of the project proponent and its stakeholders, it is considered impossible to reach the benchmark, once it would be necessary a reduction of 24.61% in the CAPEX.

O&M Costs

The result of the sensitivity analysis to benchmark shows that it would be necessary a decrease of 88.28% on O&M costs for the IRR to reach the benchmarking..

Thus, it is unlikely that these items may undergo changes that contribute with an increase in the economic and financial attractiveness that is not covered by the variation range between 0 and 10%. Therefore, the variation range between 0 and 10% cover more than the probable scenarios.

The tool for demonstration and assessment of additionality indicates that: If after the sensitivity analysis it is concluded that the proposed project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive, then proceed to Step 3 (Barrier analysis)."

This way, as the sensitivity analysis showed that the proposed activity is unlikely to be financially/economically attractive, it must proceed to Step 3 (Barrier analysis).

Step 3. Barrier analysis

This step is optional and was not applied for this project. Continue to step 04.

Step 4. Common practice analysis

Sub-step 4a. Analyse other activities similar to the proposed project activity:

The common practice analysis follows the stepwise approach suggested by CDM tool Common practice, version 03.1. Each step and respective result are presented below:

- Step 1: calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

[25] Aliança Energia. Nossa História e Estrutura Societária. Available at: <https://aliancaenergia.com.br/br/alianca-2/>. Last Access: Oct. 29th, 2019

Outcome: The installed capacity of Santana Complex is 109.2 MW. Therefore, the capacity range applicable is from 54.6 MW to 163.8 MW.

- Step 2: identify similar projects (both CDM and non-CDM) which fulfil all the following conditions:

(a) The projects are located at the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Outcome:

- To develop this step, the following procedure was applied:
- All operational plants connected to the Grid. Source were identified at ANEEL database[26].
- Selection of renewable plants (applying the same measure).
- Considering the Start date of the Project Activity as the day the plant begins to operate (November 1st, 2020), all renewable plants that are in operation were selected.
- Only plants with the capacity output calculated on STEP 1 were selected (54.6 MW to 163.8 MW).
- For Wind Power Plants, it was used database supplied by ABEEÓLICA. Through this database, it could be identified Wind Power Plants Complexes. These complexes groups several plants under the same umbrella. So, they could be compared to the Santana Wind Power Plant Complex. At ANEEL database, operational plants of each complex were presented individually. The plants identified under a complex group at ABEEÓLICA database[27] were crosschecked with the information at ANEEL database.

[26] ANEEL, 2019. Available at: <http://www2.aneel.gov.br/aplicacoes/capacidadebrasil/capacidadebrasil.cfm>. Last access on September, 2019.
[27] The ABEEOLICA database is a compilation of public information, and is only shared with its associates. Therefore, is not publicly available. A copy was shared with the VVB for the assessment of the common practice analysis.

The outcome is presented at the table below:

Table 10 – Outcome Step 2

Energy Source	Plant	Operational Starting Date	Installed Capacity (MW)	Number
Biomass	Porto das Águas	18/11/2011	160.00	1
Biomass	Eldorado	04/06/2011	140.00	2
Biomass	Barra Bioenergia	15/07/2010	136.00	3
Biomass	Cocal II	07/01/2010	131.30	4
Biomass	Santa Luzia I	02/12/2010	130.00	5
Biomass	Caçú I	29/07/2010	130.00	6
Biomass	Veracel	02/01/2006	126.60	7
Biomass	Caarapó	14/05/2010	114.00	8
Biomass	Klabin	01/01/1961	113.25	9
Biomass	Usina Bonfim	12/06/2010	111.00	10
Biomass	Conquista do Pontal	22/07/2010	110.00	11
Biomass	Bahia Pulp (Antiga Bacell)	-	108.60	12
Biomass	Jataí	28/02/2013	105.00	13
Biomass	Delta	01/12/2001	101.88	14
Biomass	Cenibra	01/01/1976	100.00	15
Biomass	Vale do Rosário	01/06/1994	97.00	16
Biomass	Angélica	18/03/2009	96.00	17
Biomass	Chapadão Agroenergia	01/11/2012	92.00	18
Biomass	Mandu	19/06/2006	90.00	19
Biomass	LDC Bioenergia Rio Brilhante (Antiga Louis Dreyfus Rio Brilhante)	02/04/2009	90.00	20
Biomass	Moema	01/01/1994	89.00	21
Biomass	LDC Bioenergia Lagoa da Prata (Antiga Louis Dreyfus Lagoa da Prata)	25/04/2009	85.00	22
Biomass	Santa Cruz AB (Antiga Ometto)	22/05/2009	84.00	23
Biomass	São José Colina	23/09/2008	83.00	24
Biomass	Santa Juliana	09/09/2010	82.00	25
Biomass	Ferrari	01/01/1982	80.50	26
Biomass	São José	01/05/1994	80.30	27
Biomass	Quirinópolis	22/11/2007	80.00	28
Biomass	Boa Vista	22/07/2008	80.00	29
Biomass	Equipav II	19/12/2008	80.00	30
Biomass	Tropical Bioenergia	12/11/2009	80.00	31
Biomass	Amandina	10/06/2014	80.00	32
Biomass	Pedro Afonso	25/09/2013	80.00	33
Biomass	Unidade de Bioenergia Costa Rica	22/11/2011	79.83	34
Biomass	Unidade de Bioenergia Água Emendada	24/01/2013	79.83	35

Biomass	Gasa	01/01/1996	78.00	36
Biomass	Ipaussu Bioenergia	09/11/2011	76.00	37
Biomass	Catanduva I (Antiga Cerradinho)	01/10/2001	75.00	38
Biomass	Costa Pinto	01/05/1977	75.00	39
Biomass	Buriti	07/10/2011	74.25	40
Biomass	Passa Tempo	01/05/2001	73.80	41
Biomass	São Martinho	01/01/1975	73.00	42
Biomass	Unidade de Bioenergia Alto Taquari	23/04/2013	72.70	43
Biomass	Unidade de Bioenergia Morro Vermelho	24/01/2013	72.70	44
Biomass	Biolins	27/02/2010	72.00	45
Biomass	Alta Mogiana	19/04/1994	71.00	46
Biomass	São Luiz	15/08/1999	70.00	47
Biomass	São João da Boa Vista	01/01/1997	70.00	48
Biomass	Pitangueiras	02/05/2002	70.00	49
Biomass	Da Pedra	31/05/2012	70.00	50
Biomass	Sebastianópolis I (Antiga Noroeste Paulista)	27/11/2009	68.00	51
Biomass	Codora	24/09/2011	68.00	52
Biomass	Esplanada (Antiga Jalles Machado)	01/07/2003	65.00	53
Biomass	Vale do Verdão	19/03/2002	65.00	54
Biomass	Biopav II	10/01/2012	65.00	55
Biomass	Guarani Cruz Alta	18/02/1982	64.80	56
Biomass	Iaco Agrícola	20/08/2014	64.00	57
Biomass	Usiminas 2	31/01/2009	63.16	58
Biomass	Barra Grande de Lençóis	14/05/2003	62.90	59
Biomass	Bioflex Caeté	03/10/2014	62.50	60
Biomass	Fartura	23/09/2006	62.00	61
Biomass	Itumbiara	29/05/2010	61.50	62
Biomass	Colombo Ariranha	-	61.00	63
Biomass	Vista Alegre	25/03/2010	60.00	64
Biomass	Vista Alegre I (Antiga Energética Vista Alegre)	31/07/2009	60.00	65
Biomass	Bioenergética Vale do Paracatu - BEVAP	15/02/2011	60.00	66
Biomass	Rio Pardo	31/10/2009	60.00	67
Biomass	Meridiano I (Antiga Meridiano)	31/07/2012	60.00	68
Biomass	Paranapanema	16/06/2012	60.00	69
Biomass	Equipav	01/10/2002	58.40	70
Biomass	Santa Elisa - Unidade I	28/08/2002	58.00	71
Biomass	Colorado	01/08/1981	56.72	72
Biomass	Quatá	01/01/1999	56.08	73
Biomass	São Judas Tadeu	13/03/2009	56.00	74
Biomass	Ituiutaba	27/05/2010	56.00	75
Biomass	Jari Celulose	01/01/1976	55.00	76

Biomass	Guaíra Energética	10/06/2010	55.00	77
Biomass	Vale do São Simão	21/10/2010	55.00	78
Biomass	Santa Cândida II	17/12/2016	55.00	79
Biomass	Volta Grande	-	54.94	80
Hydro Power Plant	Pedra do Cavalo	16/12/2004	160.00	81
Hydro Power Plant	Passo Real	01/01/1973	158.00	82
Hydro Power Plant	Itiquira (Casas de Forças I e II)	06/11/2002	157.37	83
Hydro Power Plant	Bariri (Álvaro de Souza Lima)	26/12/1969	143.10	84
Hydro Power Plant	Barra Bonita	20/05/1963	140.76	85
Hydro Power Plant	Risoleta Neves (Antiga Candonga)	07/09/2004	140.00	86
Hydro Power Plant	Guilman Amorim	02/11/1997	140.00	87
Hydro Power Plant	Baguari	09/09/2009	140.00	88
Hydro Power Plant	Fontes Nova	01/01/1940	131.99	89
Hydro Power Plant	Ibitinga	20/04/1969	131.49	90
Hydro Power Plant	Castro Alves	04/03/2008	130.00	91
Hydro Power Plant	Monte Claro	29/12/2004	130.00	92
Hydro Power Plant	Corumbá IV	01/04/2006	129.20	93
Hydro Power Plant	Dona Francisca	05/02/2001	125.00	94
Hydro Power Plant	Jauru	06/06/2003	121.50	95
Hydro Power Plant	Fundão	23/06/2006	120.17	96
Hydro Power Plant	Santa Clara	31/07/2005	120.17	97
Hydro Power Plant	Guaporé	08/04/2003	120.00	98
Hydro Power Plant	Quebra Queixo	31/12/2003	120.00	99
Hydro Power Plant	Salto	25/05/2010	116.00	100
Hydro Power Plant	Porto Estrela	04/09/2001	112.00	101
Hydro Power Plant	Euclides da Cunha	07/12/1960	108.80	102
Hydro Power Plant	Queimado	16/06/2004	105.00	103
Hydro Power Plant	Salto Grande	01/01/1956	102.00	104
Hydro Power Plant	Jurumirim (Armando Avellanal Laydner)	21/09/1962	100.96	105
Hydro Power Plant	14 de Julho	25/12/2008	100.00	106
Hydro Power Plant	Pereira Passos	01/01/1962	99.90	107
Hydro Power Plant	Corumbá III	24/10/2009	96.45	108
Hydro Power Plant	Salto do Rio Verdinho	06/07/2010	93.00	109
Hydro Power Plant	Barra dos Coqueiros	19/06/2010	90.00	110
Hydro Power Plant	Paraibuna	20/04/1978	87.02	111
Hydro Power Plant	Retiro Baixo	03/03/2010	83.66	112
Hydro Power Plant	Canoas I	09/05/1999	82.50	113
Hydro Power Plant	Caconde	22/08/1966	80.40	114
Hydro Power Plant	Coaracy Nunes	30/12/1975	78.00	115
Hydro Power Plant	Sá Carvalho	01/01/1951	78.00	116
Hydro Power Plant	Passo São João	24/03/2012	77.00	117

Hydro Power Plant	Monjolinho (Antiga Alzir dos Santos Antunes)	01/09/2009	74.00	118
Hydro Power Plant	Salto Grande (Lucas Nogueira Garcez)	31/05/1958	73.80	119
Hydro Power Plant	Rondon II	31/03/2011	73.50	120
Hydro Power Plant	Alecrim	01/01/1974	72.00	121
Hydro Power Plant	Canoas II	13/07/1999	72.00	122
Hydro Power Plant	Pirajú	12/09/2002	70.00	123
Hydro Power Plant	Engenheiro José Luiz Muller de Godoy Pereira (Antiga Foz do Rio Claro)	05/08/2010	68.40	124
Hydro Power Plant	Caçu	24/07/2010	65.00	125
Hydro Power Plant	Santa Clara	20/02/2002	60.00	126
Hydro Power Plant	Sobragi	01/07/1998	60.00	127
Hydro Power Plant	Santa Branca	21/05/1999	56.05	128
Hydro Power Plant	Itupararanga	01/01/1914	55.00	129
Hydro Power Plant	Rosal	18/01/2000	55.00	130
Wind power plant	Alegria II	30/12/2011	100.65	131
Wind power plant	Amontada	20/08/2014	75.60	132
Wind power plant	Areia Branca	09/12/2014	90.00	133
Wind power plant	Assuruá	05/04/2016	110.50	134
Wind power plant	Atlântica	17/01/2009	124.90	135
Wind power plant	Baixa do Feijão	21/05/2106	120.00	136
Wind Power Plant	Bloco Sul	27/08/2016	126.00	137
Wind Power Plant	Cacimbas	10/05/2018	86.10	138
Wind Power Plant	Caldeirão I	19/07/2017	118.80	139
Wind Power Plant	Campo dos Ventos	23/06/2016	105.60	140
Wind Power Plant	Corredor do Senandes	11/04/2015	108.00	141
Wind Power Plant	Echo 1	04/05/2012	87.60	142
Wind Power Plant	Echo 2	02/03/2016	128.00	143
Wind power plant	Echo 4	07/12/2017	83.60	144
Wind power plant	Eurus	29/03/2014	125.00	145
Wind Power Plant	Faisa	30/10/2014	136.50	146
Wind Power Plant	Fontes dos Ventos	04/02/2015	79.90	147
Wind power plant	Praia Formosa	26/08/2009	105.00	148
Wind Power Plant	Renascença	01/12/2014	150.00	149
Wind Power Plant	Riachão	27/06/2015	145.80	150
Wind Power Plant	São Miguel do Gostoso	20/06/2017	108.00	151
Wind Power Plant	Serra azul	14/11/2015	118.00	152
Wind Power Plant	Statkraft Bahia	06/07/2012	95.19	153
Wind Power Plant	Tianguá	07/10/2016	130.13	154
Wind Power Plant	Vamcruz	05/12/2105	93.00	155
Wind Power Plant	Ventos de Santo Augusto	24/03/2017	88.10	156
Wind Power Plant	Ventos do araripe 3	24/12/2016	112.70	157

Wind Power Plant	Cabeço preto II	17/11/2016	71.80	158
Wind Power Plant	Curva dos ventos	09/10/2014	56.40	159
Wind Power Plant	Icaraí	19/03/2014	65.10	160
Wind Power Plant	Modelo	25/10/2014	56.40	161
Wind Power Plant	Morro dos ventos	29/03/2014	116.40	162
Wind Power Plant	Taíba	19/06/2014	56.70	163
Wind Power Plant	Vila pará	07/10/2016	75.00	164
Wind Power Plant	Praia Formosa	26/08/2009	105.00	165
Wind Power Plant	Alegria II	30/12/2011	100.65	166
Wind Power Plant	Parque Eólico Elebrás Cidreira 1	21/05/2011	70.00	167
Wind Power Plant	Miassaba 3	01/02/2014	68.47	168
Wind Power Plant	Rei dos Ventos 3	01/02/2014	60.12	169
Wind Power Plant	Rei dos Ventos 1	01/02/2014	58.45	170
Wind Power Plant	Canoa Quebrada	26/01/2010	57.00	171
Wind Power Plant	Icaraizinho	14/10/2009	54.60	172

- Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number Nall [28].

Outcome: Thirty-eight (38) plants were identified as CDM Project (Biomass Power Plants Vale do Rosário, Moema, Catanduva I, Alta Mogiana, Esplanada, Equipav and Santa Elisa – Unidade I, Hydro Power Plants Pedra do Cavalo, Baguari, Monte Claro, Fundão, Santa Clara, 14 de Julho and Engenheiro José Luiz Muller de Godoy Pereira Wind Power Plants Amontada, Areia Branca, Atlântica, Caldeirão I, Campo dos Ventos, Corredor do Sernandes, Echo 1, Echo 2, Eurus, Faisa, Fontes dos Ventos, Renascença, Riachão, São Miguel do Gostoso, Serra Azul, Statkraft Bahia, Vamcruz, Curva dos Ventos, Icaraí, Modelo, Morro dos Ventos, Taíba, Vila Pará, Canoa Quebrada).

Therefore Nall = 134.

- Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number Ndiff.

Outcome: Forty-three (43) plants are hydro power plants and Seventy-three (73) are thermoelectrics (Biomass). Therefore N_{diff} = 116.

- Step 5: calculate factor F=1-Ndiff/Nall representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the

[28] For the present Common Practice Analysis, only CDM projects were considered, as instructed by the TOOL24. Given the low value for the F factor, considering projects from other programs would not consist on a significant change at the result.

measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

Outcome: F = 1 – 116/134 = 0.134

According to the Tool, the project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and N_{all}-N_{diff} is greater than 3.

F = 0.134 and N_{all}-N_{diff} = 18, therefore, the project activity is not a common practice.

After following all steps, it can be concluded that the project is additional.

2.6 Methodology Deviations

Not applicable. There is no methodology deviation in this project.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 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:

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

Equation 01

Where:

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 project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

If the project activity is the installation of a Greenfield power plant, then:

$$EG_{PJ,y} = EG_{facility,y}$$ **Equation 02**

Where:

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

Calculation of Combined margin CO_2 emission factor for grid connected power generation in year ($EF_{grid,CM,y}$)

According to the “Tool to calculate the emission factor for an electricity system”, version 07.0, Project participants shall apply the following six steps:

(a) **Step 1:** Identify the relevant electricity systems;

(b) **Step 2:** Choose whether to include off-grid power plants in the project electricity system (optional);

(c) **Step 3:** Select a method to determine the operating margin (OM);

(d) **Step 4:** Calculate the operating margin emission factor according to the selected method;

(e) **Step 5:** Calculate the build margin (BM) emission factor;

(f) **Step 6:** Calculate the combined margin (CM) emission factor.

In this section, project participants describe how these six steps are applied to this project:

(a) **Step 1:** Identify the relevant electricity systems;

According to the tool, “if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used. If such delineations are not available, project participants should define the project electricity system and any connected electricity system and justify and document their assumptions in the CDM-PDD”.

Brazilian DNA defined in 2008, through the resolution nº 8, that the National Interconnected System should be considered a unique electricity system and that this configuration is valid for calculating the CO2 emission factors used to estimate the greenhouse gases emissions reductions electricity generation projects.

(b) **Step 2:** Choose whether to include off-grid power plants in the project electricity system (optional);

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

The option I was chosen for the project activity, once the operation margin and build margin emission factor calculated by the Brazilian DNA or alternatively calculated by the project developer are based on data of plants connected to the grid.

(c) **Step 3:** Select a method to determine the operating margin (OM);

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

(a) Simple Operation Margin; or

(b) Simple adjusted Operation Margin; or

(c) Dispatch data analysis Operation Margin; or

(d) Average Operation Margin.

The method chosen for the calculation of operation margin emission factor for the project is the dispatch data analysis operation margin method.

(d) **Step 4:** Calculate the operating margin emission factor according to the selected method;

The method chosen for the calculation of the operation margin emission factor of this project was the dispatch data analysis.

The calculation of the Operation Margin emission factor follows the method by dispatch data analysis ($EF_{grid,OM-DD,y}$) and it is calculated and defined by the Brazilian DNA in accordance with the dispatch data supplied by ONS - National System Operator.

According to the “tool to calculate the emission factor for an electricity system”, for the dispatch data analysis OM it must be used the year in which the project activity displaces grid electricity and the emission factor must be updated annually during monitoring. This way, data are ex-post.

(e) **Step 5:** Calculate the build margin emission factor

In terms of data vintage, project participants can choose between one of the following two options:

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emission factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the built margin emission factor calculated for the second crediting period should be used.

The option that was chosen by project participants was Option 2.

(f) **Step 6:** Calculate the combined margin (CM) emission factor.

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average Combined Margin; or

(b) Simplified Combined Margin.

This Project uses option (a) to calculate the combined margin emission factor. The combined margin emission factor is calculated according to the following equation:

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$$

Equation 03

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/ MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO_2/ MWh)

W_{OM} = Weighting of operating margin emissions factor (%)

W_{BM} = Weighting of build margin emissions factor (%)

The "*Tool to calculate the emission factor for an electricity system"* recommends that the following default values should be used for W_{OM} and W_{BM}:

- Wind and Solar power generation project activities: W_{OM} = 0.75 and W_{BM} = 0.25 for the first crediting period and for subsequent crediting periods.
- All other projects: W_{OM} = 0.5 and W_{BM} = 0.5 for the first crediting period, and W_{OM} = 0.25 and W_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

This way, for the first crediting period of this project, it was adopted the following weights: W_{OM} = 0.75 and W_{BM} = 0.25.

3.2 Project Emissions

According to ACM0002: "Grid-connected electricity generation from renewable sources" (version 19.0), for most renewable energy power generation project activities, PEy = 0. This is applied to grid-connected wind power plants as the enterprises of Santana Renewable Energy.

3.3 Leakage

No other leakage emissions are considered. The emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

3.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \textbf{Equation 04}$$

Where:

ER_y	=	Emission reductions in year y (t CO_2e/yr)
BE_y	=	Baseline emissions in year y (t CO_2/yr)
PE_y	=	Project emissions in year y (t CO_2e/yr)

<u>Baseline Emissions Calculations</u>

As presented on section 3.1, the baseline emissions are calculated as follows:

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

Equation 05

Where:

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 project activity in year *y* (MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

As **Santana Renewable Energy** only comprises greenfield wind power plants, then:

$$EG_{PJ,y} = EG_{facility,y}$$

Equation 06

For the period 01/11/2021 to 01/11/2031 (DD/MM/YYY), $EG_{facility,y}$ was estimated as the product between Installed Capacity of Each Plant, Plant Load Factor and the number of hours per year (8,760 hours per year). Table below shows the estimation of $EG_{facility}$ for this period.

Table 11 - EGfacility Estimation

WPP	Installed Capacity (MW) (A)	Plant Load Factor (%) (B)	EGfacility,y Estimation C = A x B x 8,760 (MWh)
Acauã I	25.2	57.57	127,077
Acauã II	21	57.57	105,898
Acauã III	16.8	57.57	84,718
Baixa do Sítio	46.2	57.57	232.975
Total			550,669.15

To calculate the combined margin emission factor, the following equation is used.

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y}$$

Equation 07

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/ MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO_2/ MWh)

W_{OM} = Weighting of operating margin emissions factor (%)

W_{BM} = Weighting of build margin emissions factor (%)

For this first crediting period of the project, WOM = 0.75 and WBM = 0.25.

For ex-ante emission reductions estimations from 01/11/2021 to 31/10/2031 (dd/mm/yyyy), $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ for 2018 were used. This is the latest information available, these parameters were calculated by Brazilian DNA[29].

The values are:

$EF_{grid,OM,2018}$ = 0.5390 tCO_2e/MWh

$EF_{grid,BM,2018}$= 0.137 tCO_2e/MWh

Applying these values to Equation 03,

$EF_{grid,CM}$,2018 = 0.75 X 0.5390 + 0.25 X 0.137 = **0.4385 tCO_2/MWh**.

Applying estimation of annual E_{GPJy} to equation 02, BE_y = 550,669.15 MWh X 0.4385 tCO2e/MWh = 241,485 tCO_2e/year.

As this project does not present any emission nor leakage, net emission reduction is equal to baseline emissions as presented in the table below.

Table 12 - Emission Reduction Estimation

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
2021	40,357	0	0	40,357
2022	241,485	0	0	241,485
2023	241,485	0	0	241,485

[29] Source: MCTI, 2019. http://www.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/index.html . Accessed on October, 2019.

2024	241,485	0	0	241,485
2025	241,485	0	0	241,485
2026	241,485	0	0	241,485
2027	241,485	0	0	241,485
2028	241,485	0	0	241,485
2029	241,485	0	0	241,485
2030	241,485	0	0	241,485
2031	201,127	0	0	201,127
Total	2,414,849	0	0	2,414,849

4 MONITORING

4.1 Data and Parameters Available at Validation

Table 6 - Data and Parameters Available at Validation

Data / Parameter	The percentage share of total installed capacity of the specific technology
Data unit	%
Description	The percentage share of total installed capacity of the specific technology in the total installed grid connected power generation capacity in the host country
Source of data	ANEEL
Value applied	9.0%
Justification of choice of data or description of measurement methods and procedures applied	Data provided by ANEEL[30]
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	The total installed capacity of the technology
Data unit	kW
Description	The total installed capacity of the technology in the host country
Source of data	ANEEL
Value applied	14,872,793

[30] ANEEL Management Information Report, March/2019. Available at: <https://www.aneel.gov.br/documents/656877/14854008/Boletim+de+Informa%C3%A7%C3%B5es+Gerenciais+-+1%C2%BA+trimestre+de+2019/b860054f-79ec-6608-951a-fb2288701434>. Last access on October, 2019.

Justification of choice of data or description of measurement methods and procedures applied	Data provided by ANEEL[30]
Purpose of Data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

Table 7 – Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)
Source of data	Meters at substation Lagoa Nova 2
Description of measurement methods and procedures to be applied	Electricity Meters
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value applied	550,669.15 MWh (for a complete year)
Monitoring equipment	At the substation Lagoa Nova 2, there are two meters (one principal and one rear) that register net electricity supplied to the grid by the project. Class, precision and calibration procedures of the meters shall follow ONS and National Authorities Guidelines and Procedures.
QA/QC procedures to be applied	The uncertainty level for these data is low. The electricity supplied to the grid is monitored by the project participants directly from the meters. Operation and Maintenance (O&M) team supports measurement data collection and cross-checks the information with data provided by CCEE's Website (Electric Power Commercialization Chamber). Meters are calibrated according to National Operator of the System (ONS) Procedures.
Purpose of data	Calculation of baseline emissions

Calculation method	Two meters are located in the Substation Lagoa Nova 2 that registers net electricity generated by all plants to the Grid. No calculation is necessary.
Comments	CCEE - Entity responsible for measurements, accounting and settlement on Brazilian electric energy market.

Data / Parameter	$EF_{Grid,CM,y}$
Data unit	tCO_2e/MWh
Description	Combined margin emission factor for the grid in year y
Source of data	The combined margin emission factor will be calculated using the procedures of the "Tool to calculate the emission factor for an electricity system", version 07.0. $EF_{grid,OM,y,}$ and EFgrid, BM,y data will be supplied by Brazilian Designated National Authority of the CDM (Brazilian DNA). The combined margin emission factor used on the Project will be calculated based on data of National Interconnected System supplied by Brazilian DNA.
Description of measurement methods and procedures to be applied	As per the "Tool to calculate the emission factor for an electricity system". For this the first crediting period of the project, WOM = 0.75 and WBM = 0.25. As Santana Renewable Energy uses Dispatch data analysis OM method for operating margin emission factor, EFgrid,OM,y is calculated ex post. For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For ex-ante emission reductions estimations from 01/011/2021 to 31/10/2031 (dd/mm/yyyy), EFgrid,OM,y and EFgrid,BM,y for 2018 were used. This is the latest information available. These parameters were calculated by Brazilian DNA.
Frequency of monitoring/recording	Annually
Value applied	0.4385 tCO_2e/MWh from 2018 to the end of the crediting period.
Monitoring equipment	Not applicable
QA/QC procedures to be applied	As per the "Tool to calculate the emission factor for an electricity system".

Purpose of data	Calculation of baseline emissions
Calculation method	As per the “Tool to calculate the emission factor for an electricity system”. Dispatch Data Analysis for OM Operating Margin Emission Factor. Data supplied by Brazilian CDM DNA will be used.
Comments	More information was described on item 3.

4.3 Monitoring Plan

Monitoring has the objective of measuring the emission reductions achieved by the project. The monitoring plan follows the Monitoring Methodology of consolidated baseline methodology for grid-connected electricity generation from renewable sources ACM0002, version 19.0. All data collected as part of monitoring should be archived electronically and be kept at least for two years after the end of the last crediting period. All measurements will be conducted with calibrated measurement equipment according to Brazilian industry standards. The main parameters that will be monitored are:

- $EG_{facility,y}$ - Quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr);

- Combined margin emission factor for the grid in year y ($EF_{Grid,CM,y}$)

<u>Monitoring of EGfacility,y</u>

Operation and Maintenance (O&M) team is responsible for the operation and maintenance activities of the Santana Wind Power Plant, as well as for measurement activities. It collects and storages all measurement data.

Aliança Geração de Energia S.A. has a specific Generation and Measurement Data Management procedure, where responsibilities for monitoring and service flows are determined, as required by the ONS’s procedures: Sub-module 12.3 Maintenance of the billing measurement system and Sub-module 12.4 Collection of measurement data for billing; as well as required by the CCEE commercialization procedures: Sub-module 2.1 Collection and adjustment of measurement data.

O&M team is also responsible for monitoring and analyzing $EG_{facility,y.}$ information. Its main activities are listed as follows:

- Daily collection of generation data in management systems;

- Analysis of extracts from collections in the SCDE system (CCEE);

- Collection and connectivity tests in the SCDE system (CCEE);

- Comparison of the amounts of Gross and Net Energy extracted from the management systems;

- Comparison of the amounts of energy recorded by the management systems and collections in the SCDE system (CCEE).

In case of divergence during these procedures, the mass memory of the meters is cross-checked with the extracts and collection by the SCDE system, from CCEE. In addition, if any inconsistent information or missing data are found during this cross-checking procedure, arrangements for notification of abnormalities are taken, indicating the appropriate technical justifications and measures for normalization of collections. In case data inconsistencies on the main meter are proved, a notification for "Disregard of the main meter" is opened, highlighting the period where backup meter data shall be considered. Immediate maintenance action should occur, and an extension on the period where the backup meter data should be used must be requested until de main equipment is replaced.

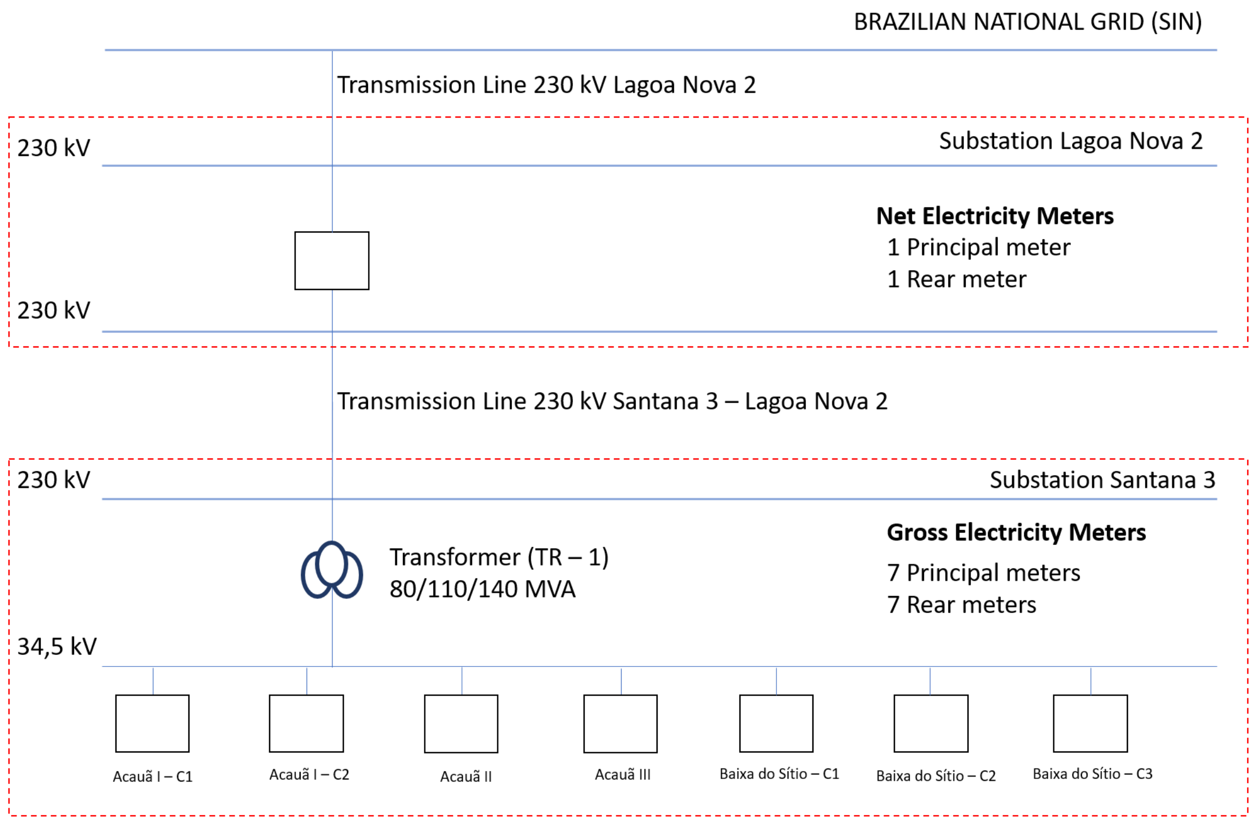
Moreover, the measurement system is integrated to a supervision and control system, with specific automated alarms to point out any flaws on measurement procedures, monitored by a specific team.

The Wind Power Plants are connected to Substation Santana 3 (34.5 to 230 kV), where there are fourteen meters (seven principal and seven rear) that register gross electricity generated by the project.

Energy from Santana Wind Power Plants are then conducted through a transmission line (230 kV) to substation Lagoa Nova 2, where two meters (one principal and one rear) that register net electricity supplied to the grid ($EG_{facility,y}$) by Santana Renewable Energy project are located. These meters can also include energy generated by facilities outside the project boundary. The total amount of energy dispatched to the SIN monitored by these meters will be prorated between each project facility according to the proportional amount of electricity generation measured in the electrical substation for each facility.

ONS Grid Procedures defines the calibration frequency and other maintenance procedures. All meters of the plants are calibrated according to Brazilian Standards.

Diagram below shows the measurement scheme of the project:



In the diagram, Acauã I - C1 and Acauã I - C2 correspond to three turbines each, Acauã II correspond to five turbines, Acauã III, Baixa do Sítio - C1 and C2 correspond to four turbines each, and Baixa do Sítio - C3 correspond to three turbines. The seven groups are connected to the transformer on Substation Santana 3.

It is important to state that net electricity supplied to the grid impacts directly the revenues of the plants once electricity is the main product of the project. Therefore, a straight control is performed about this information. In addition, given that Aliança Geração de Energia S.A. is an independent energy productor with more than 50 MW installed capacity, it is obliged to register the power purchase agreements at the Electric Power Commercialization Chamber (CCEE). For this reason, the "Module 12 - Billing Measurement for National System Operator" and "Sub-module 2.1 Collection and adjustment of measurement data" network procedure requirements must be met.

Monitoring of $EF_{Grid,CM,y}$

The Combined margin emission factor for the grid in year y is calculated by consulting company hired by project proponents. Calculations follows Tool to calculate the emission factor for an electricity system, version 07.0 as described on section 02. Data supplied by Brazilian CDM DNA will be used.

5 SAFEGUARDS

5.1 No Net Harm

The Simplified Environmental Report is part of the environmental licensing, which is a legal obligation in Brazil. Before construction phases, some impacts were identified at the Simplified Environmental Report (*Relatório Ambiental Simplificado* in Portuguese - RAS) and monitoring programs were designed to mitigate these impacts. The Environmental Basic Program gives details of actions taken to mitigate socio-economic impacts.

At this section, project proponents present just the negative environmental and social impacts identified at the RAS and actions planned to mitigate them. It is worth pointing out that main impacts of the project were identified as positive impacts but are not mentioned in this section.

The negative impacts identified for the project are:

- Landscape modification;
- Air quality interference;
- Noise interference;
- Production of solid residues and wastewaters;
- Water quality interference;
- Variations in the pressure over the road system;
- Risk of disease spread;
- Risks of road accidents involving local population and wildlife;
- Interference in the local fauna and flora;
- Increase in vehicle traffic;
- Wildlife disturbance;
- Occurrence of erosive process and siltation;
- Risk of work accidents;
- Land geotechnical alterations;
- Alteration in hydric conditions.

To mitigate these impacts, several actions were planned in the Simplified Environmental Report. The main actions are presented as follows:

- Stormwater drain project;
- Civil Works Signalling Program;
- Workforce Protection and Workplace Safety Program;
- Erosive Processes Monitoring and Prevention Program;
- Program for Solid Wastes Management;
- Recuperation of Degraded Areas Program;
- Social Communication Program;
- Environmental Education Program;
- Wildlife Monitoring Program;
- Noise Monitoring Program;
- Water Quality Monitoring Program;
- Archaeological Patrimony Identification Plan;
- Environmental Risks monitoring Program;
- Project for adequation of road access to the Entrepreneurship.

5.2 Environmental Impact

The environmental licensing is a legal obligation prior to the installation of any entrepreneurship or activity potentially pollutant or degrading to the environment in Brazil. The obligation of environmental licensing in Brazil is shared by State Environmental Organs and by Ibama – Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis (Brazilian Institute of Environment and Renewable Natural Resources), as part of SISNAMA – Sistema Nacional de Meio Ambiente (National Environmental System).

Sustainable Development and Environment Institute of Rio Grande do Norte State (IDEMA) is responsible for environmental licensing of the wind power plants comprised in the project. At the time of this Project Description elaboration, all plants have Preliminary licenses and have requested Installation Licences for all WPPs. The number of each Preliminary License and Request number and date of Installation License was presented on section 1.11 of this report.

The process of environmental licensing has three different phases: Preliminary Licensing, Installation Licensing and Operation Licensing. Preliminary License (PL) does not authorize the installation of the project. It approves the environmental viability of the project and authorizes its location and technological conception. Besides, it establishes the conditions to be considered in the development of the executive project. The Installation License (LI) authorizes the start of the entrepreneurship construction. The deadline for this license is established by the timetable of the project construction, which cannot be superior to 6 (six) years.

The Operation License (LO) must be requested before the entrepreneurship begins its operation, once it authorizes the start up. Its issuance is conditioned to an inspection to verify whether all the demands and technical details described in the project approved were developed. It is also verified if they meet what is expected in the LP and LI. During the licensing process, some entities as Federal Entities Historic Heritage Management (*Órgãos Federais de Gestão do Patrimônio Histórico* – IPHAN), Indigenous National Foundation (FUNAI), Traditional Quilombolas Communities (Fundação Palmares), Health National Foundation (FUNASA) are consulted.

To subsidize the LO phase, the entrepreneur elaborates a group of reports, describing the execution of the environmental programs and mitigating measures expected in the phases of LP and LI.

Potential negative impacts of the plants and actions planned to mitigate them were presented on section 5.1. In this section, we also present positive impacts of the projects identified on Simplified Environmental Report.

- Generation of positive expectations in the communities surrounding areas of direct impact, as many may envision some business and / or employment opportunity because of the project;
- Demand for specialized services;
- Direct and Indirect jobs and income generations;
- Use and rational occupation of the land;
- Proposal for environmental control and monitoring;
- Delimitation of environmental interest areas;
- Promotion of industrial development;
- Living conditions improvements in the state;
- Increase in local population purchase power;
- Local commerce and services growth/stimulation;
- Increase in taxes collection;
- Sanitary and environmental control;
- Variation in the basic support services.
- Variation in the energy availability to the state;

- Local accessibility improvement.

5.3 Local Stakeholder Consultation

Local stakeholder Consultation is one of the phases of the Licensing process. According to the CONAMA Resolution n. 237/97, when an environmental license (Preliminary, installation and operational license) is requested or renewed, it must be made public for the communities that may be affected by the project activity, regardless the level of impact it may be subject to. This procedure consists on informing the main characteristics of the wind power plants, such as installed capacity and location.

The process of issuance for the Preliminary licenses involve the fulfilment of a series of requirements at each stage, thoroughly checked by the government. The public consultation process conducted was sufficient to meet the necessary requirements of the current stage of the project development (Preliminary License).

At this stage, all environmental data and information registered under the National System of Environment (*Sistema Nacional de Meio Ambiente* in Portuguese – SISNAMA) must be available for public consultation as per law n. 10.650 of April 16th of 2003. To meet this requirement, a National Website for Environmental Licensing (PNLA – *Portal Nacional de Licenciamento Ambiental* in Portuguese) was developed by the Environmental Ministry. Therefore, all the information registered for the project is available at the website for public consultation regarding the Preliminary licences[31]. Information about the installation Licences are not available at the website because they have not been emitted yet. Meanwhile, additional information about the Preliminary Licenses can be found at the IDEMA website[32].

Additional comments may also be directed to the project through the website of Aliança Geração de Energia S.A.[33]

During the licensing process of the Wind Power Plants of the Santana project, an inform about the Preliminary licensing request was published at the Official Journal of the state of Rio Grande do Norte on November 18th, 2017, and installation licensing request was published at the same journal on September 6th 2019. Inputs could be presented any time since the day of the announcement, and a channel for additional contributions will remain available throughout the project implementation. Questions raised from local stakeholder consultation will be answered by Aliança Geração de Energia S.A. and dully registered by the entrepreneurship.

No comments from local stakeholders were received through the website of Aliança Geração de Energia S.A. or the environmental entity responsible for the licensing process.

[31] Please, see at: <http://pnla.mma.gov.br/pesquisa-de-licenciamento-ambiental>, under "Filtros por empreendedor", "Número do processo de licenciamento", the codes: 2017-113286/TEC/LP-0087, 2017-113298/TEC/LP-0088, 2017-113313/TEC/LP-0094 and 2017-113315/TEC/LP-0095. Select "Detalhar Licenças" at the field for RN – IDEMA.
[32] Please, see at: <http://sistemas.idema.rn.gov.br/licencas/licencas_emitidas.asp>, under "Tipo de Processo" choose "LP", select "Setembro" for "Mês" and 2017 for "Ano". See the project numbers: 2017-113298/TEC/LP-0088, 2017-113313/TEC/LP-0094 and 2017-113315/TEC/LP-0095.
[33] Inputs about the project may be presented at: <https://aliancaenergia.com.br/br/fale-conosco/>.

Any comments received during the implementation of the project shall be dully registered by the environmental entity responsible for the licensing process and by Aliança Geração de Energia S.A.All comments will be reviewed and addressed to the responsible sectors within Aliança.

For the issuance of the Installation License, the following actions were planned, and will be verified by local authorities for the project's continuation to be approved. Such plan constitutes the Environmental Programs Detailed Report (RDPA – Relatório do Detalhamento dos Programas Ambientais in Portuguese), which details all plans and programs presented at the RAS (Simplified Environmental Report), to meet the regulation and demands of IDEMA to obtain the Installation License (following stage of project development). The main activities are:

- Social communication program;
- Employee protection plan, safety in the workplace and environmental emergency;
- Training program and use of local manpower.

The most comprehensive activity to receive inputs from local community is the social communication program which aims to inform and answer questions posed by the local population, creating a communication channel between the community and the project developers. The main objective is to better understand their necessities and how to meet their needs.

The target audience for the program are the communities from Santana do Matos, Lagoa Nova, Tenente Laurentino Cruz and São Vicente (both authorities and residents), teachers and students from the region, technicians and employees involved during the installation and operation of the project activity and directors and technicians of the Institute of Sustainable Development and Environment of Rio Grande do Norte.

The program shall start at the beginning of the installation of the wind power plant, and end six months after the beginning of the operation of the wind power plant. Public meetings will take place on a monthly basis on a strategic place to enable the attendance of a bigger audience. The participants will sign an attendance list, and a report will be structured, informing number of attendants, their comprehension about the information given, and main questions and inputs.

The ongoing process involves the obtainment of additional licenses for which the following stages of public consultation must also be proven, as it is set out in Aliança's plan for the project implementation.

Aliança's plan will guide the following stages and its completion must be verified, or else the following licenses shall not be granted. The company must present all evidences that the concernments of the local community presented at the public meetings during the installation of the project were taken into account, or It will not obtain the Operational License.

Additionally, according to the company's plans, the public meetings will continue to take place even after the project is operational, and must be registered, in order to meet the requirements by law.

At the time of this Project Description, no comments were received, and therefore, did not cause any changes in the project.

5.4 Public Comments

The project was published for public comments as indicated by VCS rules and it did not receive any comments.