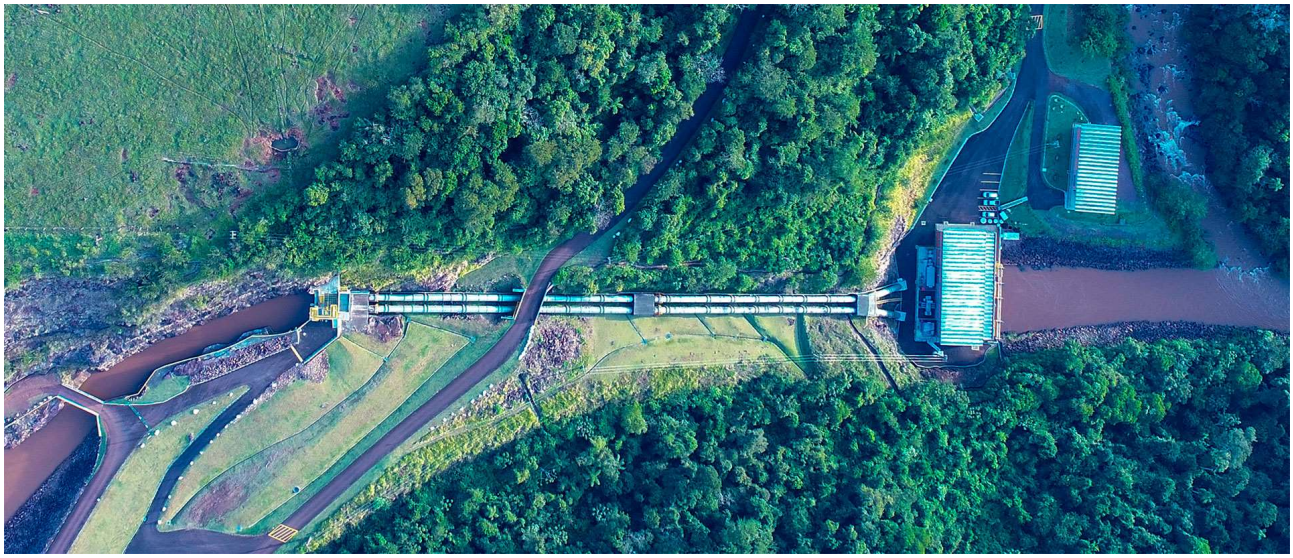
PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT



Title: 14 MW SHP SÃO FRANCISCO

Version 2.0

Date 26/07/2023

First CoU Issuance Period: 10 years

Date: 01/01/2013 to 31/12/2022

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

BASIC INFORMATION	
Title of the project activity	14 MW SHP São Francisco
Scale of the project activity	Small Scale
Completion date of the PCN	26/07/2023
Project participants	GÊNESIS ENERGÉTICA SA (OWNER) EG S CONSULTORIA E NEGÓCIOS LTDA (AGGREGATOR)
Host Party	Brazil
Applied methodologies and standardized baselines	Applied Baseline Methodology: AMS I.D.: "Grid connected renewable electricity generation" Version 18.0 Standardized Methodology: Not Applicable.
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Amount of GHG emission reductions for this monitoring period in the registered PCN	2013: 38,850 CoUs (38,850 tCO2eq)
	2014: 37,670 CoUs (37,670 tCO2eq)
	2015: 35,780 CoUs (35,780 tCO2eq)
	2016: 36,672 CoUs (36,672 tCO2eq)
	2017: 21,287 CoUs (21,287 tCO2eq)
	2018: 26,886 CoUs (26,886 tCO2eq)
	2019: 13,229 CoUs (13,229 tCO2eq)
	2020: 6,569 CoUs (6,569 tCO2eq)
	2021: 13,757 CoUs (13,757 tCO2eq)
	2022: 13,548 CoUs (13,548 tCO2eq)
Total:	244,248 CoUs (244,248 tCO2eq)

SECTION A. Description of project activity

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

The proposed project title under UCR is "14 MW SHP SÃO FRANCISCO", which is a Hydro Power project located in the cities of Toledo and Ouro Verde do Oeste, state of Paraná, Brazil. The project is an operational activity with continuous reduction of GHG, currently being applied under "Universal Carbon Registry" (UCR). This is a run of the river project located on River São Francisco Verdadeiro.

Purpose of the project activity:

The project activity is a renewable power generation activity which incorporates installation and operation of 2 Horizontal Axis Francis Turbines, having individual nominal capacity of 7.20 MW. This project has been promoted by Gênesis Energética S/A. The Project is connected to the city of Toledo and supplies 14 MW of power to the national grid "SIN" (Sistema Interligado Nacional) through the local grid.

The powerplant was commissioned in November 2010, when the environmental entity from the state of Paraná, IAT (Instituto Água e Terra), issued the Operation License.

As per the ex-ante estimate, the project will generate approximately 72,000 MWh of electricity per annum and supply it to the national grid. The renewable power generated by the project activity would be displacing equivalent amount of grid electricity which has a relevant contribution of fossil-fuel based power plants, resulting in an estimated emission reduction of 25,869 tCO2 per annum from 2013 to 2022. The estimated annual average and the total CO2e emission reduction by the project activity during the first CoU period was submitted as a part of first monitoring and verification, resulting in a total of 244,248 tCO2eq of emission reduction.

Since the project activity generates electricity through a run-of-river hydroelectric, a clean renewable energy source, it does not cause any significant negative impact on the environment and thereby contributes to climate change mitigation efforts.

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

For ANEEL (Agência Nacional de Energia Elétrica), a governmental agency that regulates over the energy sector, any hydroelectric with power capacity up to 30 MW, shall be considered as a Small Hydropower and should attend to specific conditions to reduce any environmental impact. Complementing these conditions, any hydropower project should be submitted to city, state or federal environmental agencies approval, and start commercial operations after it fulfills all conditioning to avoid any social, cultural and environmental harm. After the conditions are met, the agency issues an Operation License, for a determined period of duration, with the possibility of being renewed after the end of this period. In this case, the license was issued by IAT by the first time in November of 2010 under the number 22455, and was recently renewed in September 23rd of 2021 (link).

Environmental benefits:

- Use of hydro energy, which is a clean energy source.
- Power generation with zero emission of GHG gases or specific pollutants like SOx, NOx, and SPM .
- Effort to minimize the dependence of the Brazilian energy matrix on fossil fuels.
- Minimum impact on land, water and soil at project surroundings.
- Cooperation agreement between Gênesis Energética SA and the city of Ouro Verde do Oeste to provide financial resources for the installation of protection fences around the Permanent Preservation Areas of the tributaries of the São Francisco Verdadeiro river, in the influence area of the powerplant.
- Creation and preservation of a Private Natural Reserve (RPPN) with an area of 906,447 m² at powerplant surroundings. In accordance with Brazilian law, this nature reserve is permanently registered in the property registration, without the possibility of being subjected to any kind of depredation or deforestation. This is an initiative by Gênesis Energética SA, which would not have happened in the absence of the installation of the powerplant. (link)

Private Natural Reserve area (Source: Google Earth)

Economic benefits:

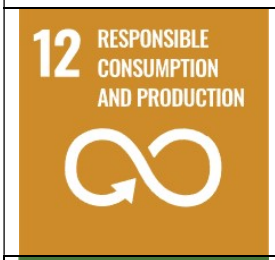
- Greater supply of energy, ensuring the development of the region.
- Ensure the growth of the agribusiness in the cities of Toledo and Ouro Verde do Oeste, providing clean and cheaper energy, ensuring the creation of jobs and business opportunities.
- Low-cost energy to consumers.

- Clean technology development in Brazil.

Social benefits:

- 322 employment opportunities created for the local workforce during project's construction.
- 11 permanent employment opportunities created for operation and maintenance of the powerplant.
- Development of the surroundings due to city, state and federal taxes collected during construction and operation of the powerplant.
- Cooperation agreement between Gênesis Energética SA and the city of Ouro Verde do Oeste for the supply of materials for the implementation of a recycling center near the municipal landfill and expansion of the city garage.

Sustainable Development Goals (SDG) Achieved with the project:

SDG	TARGET	ACHIEVED HOW?
	6.6 - By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	Supporting Permanent Preservation Areas at the surroundings of São Francisco Verdadeiro river tributaries.
	7.2 - By 2030, increase substantially the share of renewable energy in the global energy mix.	Installed Greenfield Small Hydro Powerplant.
	8.3 - Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	322 jobs created during powerplant construction, and 11 permanent jobs created for SHP operations. Providing clean and cheaper energy to develop the region, aiding the creation of new businesses.
	12.5 - By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.	Supported the construction of a recycling center.
	13.2 – Integrate climate change measures into national policies, strategies and planning.	Reduction of GHG emissions through renewable energy generation.

	15.1 - By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.	Creation and preservation of a Private Natural Reserve (RPPN). Supporting Permanent Preservation Areas

A.3. Location of project activity >>

Country: Brazil
District: Toledo
State: Paraná
Code: 82520-100

Latitude: -24,73032°
Longitude: -53,896279°

(Source: Raphael Lorenzeto de Abreu/Wikipedia)

(Source: Google Earth)

A.4. Technologies/measures >>

The proposed project activity is installation and operation of 2 Francis Turbines, with horizontal axis, having individual capacity of 7.2 MW and with aggregated installed capacity of 14 MW.

The generators generate power at 6.9 kV and at a frequency of 60 Hz, which is Brazilian standard. The voltage is stepped up at the powerplant substation to 34.5 kV to supply the local grid, which is connected to the national grid.

Specification	Value
Hydrology	Average water flow: 16.6 m^3/s Firm water flow: 3.8 m^3/s
Adduction Channel	Length: 201 m Section: 13.75 m^2
Penstock	2 units Circular Steel Diameter: 1.6 m Length: 211 m
Water Intake	Conventional Type Height: 15.2 m Length: 13.3 m
Power House	Sheltered type Width: 16.87 m Length: 33.45 m Installed Capacity: 14 MW
Spillway Weir / Dam	Gravity Concrete Built Length: 295 m Height: 21.4 m
Spillway	592.0 m^3/s
Turbine	2 units Francis - Horizontal Axis Unit Nominal Power: 7.2 MW Synchronous Rotation: 600 rpm
Generator	2 units Unit Nominal Power: 8,000 kVA Nominal Voltage: 6.9 kV Power Factor: 0.875
Power Transformer	1 unit Unit Nominal Power: 16,000kVA 6.9kV / 34.5kV
Transmission	Overhead Transmission Line 17.0 km 34.5 kV

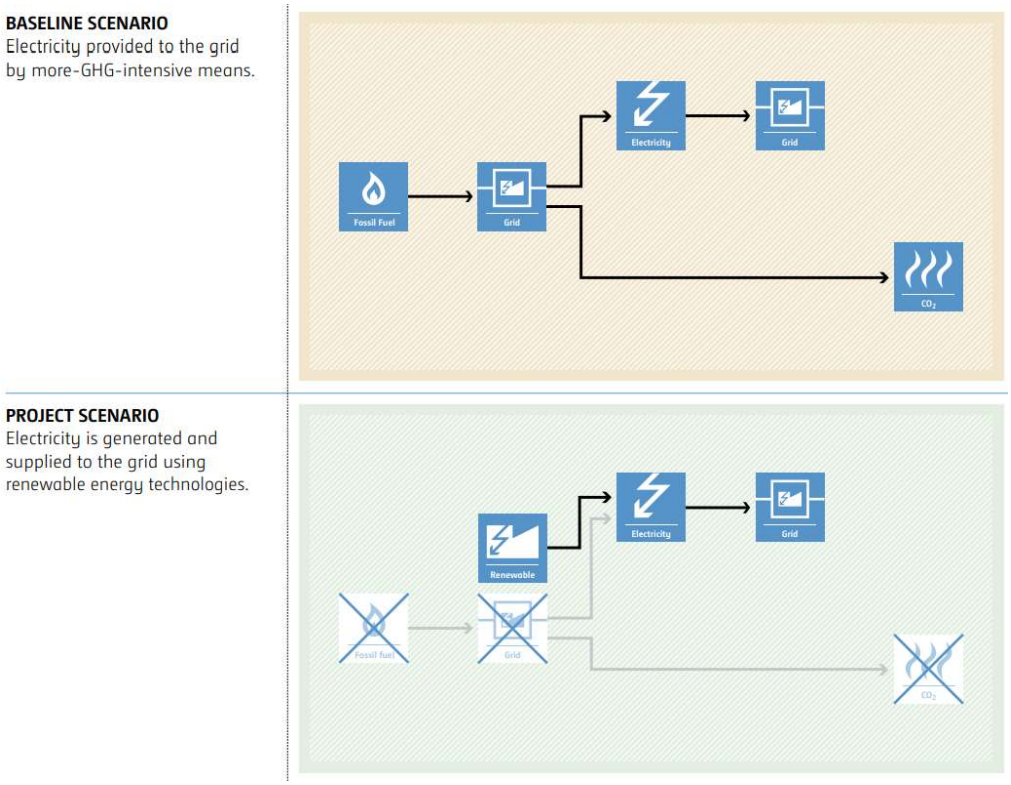
A.5. Parties and project participants >>

Party (Host)	Participants
Brazil	Owner: Gênesis Energética SA Rua Wiegando Olsen 2020 Curitiba - PR 80430-180 Aggregator: EG S Consultoria e Negócios LTDA (EGREENER). Rua Tabapuã 245, conj. 31 Itaim Bibi São Paulo – SP 04533-010 egreener.io

A.6. Baseline Emissions>>

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

- The project activity involves generating clean energy from hydro source and supply it to the national grid. In the absence of the project activity, the equivalent amount of power would have been supplied by national grid-connected power plants and by the addition of other-more-GHG-intensive generation sources.



A.7. Debundling>>

This 14 MW SHP São Francisco project is not a debundled component of a larger project activity.

SECTION B. Application of methodologies and standardized baselines

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

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

TYPE:
I – Renewable Energy Projects

CATEGORY:
AMS-I.D. - "Grid connected renewable electricity generation", Version 18.0. This methodology comprises of activities that include the construction and operation of a power plant that uses renewable energy sources and supplies electricity to the grid (Greenfield power plant).

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

	Applicability	Project
1.	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	(a) Supplying electricity to a national or a regional grid.
2.	This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s).	(a) Install a Greenfield plant.
3.	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: (a) The project activity is implemented in existing reservoir, with no change in the volume of the reservoir; or (b) The project activity is implemented in existing reservoir, where the volume of the reservoir(s) is increased and the power density as per definitions given in the project emissions section, is greater than 4 W/m2.	It is run of river type of project; hence, this criterion is not applicable.

	The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m2.	
4.	If the new unit has both renewable and non-renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	There are no non-renewable components, thus this criterion is not applicable to this project activity.
5.	Combined heat and power (co-generation) systems are not eligible under this category.	The project is a hydroelectric and thus, the criterion is not applicable to this project activity.
6.	In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The proposed project is a greenfield hydroelectric, thus, this criterion is not applicable to this project activity.
7.	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	The proposed project is a greenfield hydroelectric, thus, this criterion is not applicable to this project activity.
8.	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid, then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as “AMS- I.C.: Thermal energy production with or without electricity” shall be explored.	The proposed project is a greenfield hydroelectric, thus, this criterion is not applicable to this project activity.

9.	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	The proposed project is a greenfield hydroelectric, thus, this criterion is not applicable to this project activity.

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

There is no double accounting of emission reductions in the project activity due to the following reasons:

- Project is uniquely identifiable based on its location coordinates,
- Project has dedicated commissioning certificate and connection point,
- Project is associated with energy meters which are dedicated to the consumption point for project developer.

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

As per applicable methodology AMS-I.D. Version 18.0, The project boundary is as follow:

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

Thus, the project boundary includes the Hydro Power Plant and the respective Brazilian grid system, as per the following scenario:

Scenario	Source	GHG	Included?	Justification/Explanation
Baseline	Grid Connected Electricity Generation	CO2	Yes	Main emission source
		CH4	No	Not identified in the baseline methodology
		N2O	No	Not identified in the baseline methodology
Project	Greenfield Hydro Power Project Activity	CO2	No	Zero-emissions grid connected electricity generation from renewable energy
		CH4	No	Zero-emissions grid connected electricity generation from renewable energy
		N2O	No	Zero-emissions grid connected electricity generation from renewable energy

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

Baseline emissions include only CO2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.

The actual emission reduction achieved during the first issuing period shall be submitted as a part of monitoring and verification. For an ex-ante estimation for the period from 2013 to 2022, the following calculation has been submitted:

Emission Reductions are calculated as follows:

$ER_y = BE_y – PE_y – LE_y$ Where:
ER_y = Emission reductions in year y (tCO2/y)
BE_y = Baseline Emissions in year y (t CO2/y)
PE_y = Project emissions in year y (tCO2/y)
LE_y = Leakage emissions in year y (tCO2/y)

Estimated Annual Baseline Emission Reduction : $BEy=EGPJ,y\times EFgrid,y$

BE_y = Baseline emissions in year y (t CO2)

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

$EF_{grid,y}$ = Combined margin CO2 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 CO2/MWh)

As determined by "Tool to calculate the emission factor for an electricity system – Version 07.0" for Brazil, the combined margin should be calculated using the "Weighted average CM", as it follows:

$EF_{grid,CM,y} = EF_{grid,OM,y}\times w_{OM} + EF_{grid,BM,y}\times w_{BM}$ Equation (16)

Where: $EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (t CO2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y (t CO2/MWh)
w_{OM} = Weighting of operating margin emissions factor (per cent)
w_{BM} = Weighting of build margin emissions factor (per cent)

Since the project is a hydroelectric:
$w_{OM} = 0.5$
$w_{BM} = 0.5$

For the Build and Operation margin emission factor, was considered the public data for the year of 2012 available in the Ministry of Science, Technology and Innovation website (link):

BM = 0.2010
OM = 0.5176

Resulting in $EF_{grid,CM,y} = 0.3593$

Estimated power generation per year as 72,000 MWh,

Resulting in $BE_y = 25{,}869$ tCO2

Since the project is a run of river hydro project:

$PE_y = 0$
$LE_y = 0$

So as result $ER_y = BE_y$

Estimated Annual emission reductions ERy = 25,869 CoUs /year (25,869 tCO2eq/yr)

After Monitoring Report:
Actual Total emission reductions ERy = 244,248 CoUs (244,248 tCO2eq)

B.6. Prior History>>

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

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

Crediting period start: 01/01/2013.
There is no change in the start date of crediting period.

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

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

B.9. Monitoring period number and duration>>

First Issuance Period: 10 years – 01/01/2013 to 31/12/2022

B.8. Monitoring plan>>

PARAMETERS BEING MONITORED OR USED IN EMISSION REDUCTIONS DETERMINATION

Data/Parameter	$EF_{grid,y}$
Data unit	tCO2e/MWh
Description	CO_2 emission factor of the grid electricity in year y
Source of data Value(s) applied	https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao
Measurement methods and procedures	As per the requirements in "Tool to calculate the emission factor for an electricity system"
Monitoring frequency	Annually
Purpose of data	To estimate baseline emissions.

Data / Parameter:	$EG_{pj,y}$
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the

	project plant/unit to the grid in year y
Source of data:	The data provided by the Câmara de Comercialização de Energia Elétrica – CCEE (Electric Energy Trading Chamber)
Measurement procedures (if any):	This parameter should be either monitored using bidirectional energy meter or calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid; and (b) the quantity of electricity the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid
Monitoring frequency:	Continuous monitoring, hourly measurement and at least monthly recording
QA/QC procedures:	The meters and current transformers will be subjected to periodic calibrations/audits from ANEEL and CCEE to certify that electric energy injected in the grid data is reliable and precise, in a way to guarantee the reliability of the national grid and energy supply. As determined by government entity ONS (National Electric System Operator), in the "Submodule 6.16 - Maintenance of the billing measurement system" item 1.1.2, the calibration of the meters must occur every 5 years.