



SOUBRE HYDROPOWER PROJECT MONITORING REPORT



Document Prepared by AERA GROUP

ON BEHALF OF CI-ENERGIES

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PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Soubré Hydropower Project(hereafter referred to as “Soubré HPP”) is a greenfield project located on the Sassandra river about 5 km from Soubré village, Côte d’Ivoire. Soubré HPP is composed of a run-of-river hydropower plant with a capacity of 270 MW and a micro-hydro power plant of 5.354 MW for a total of 275.354 MW generating capacity with a total estimated average gross electricity generation of 1,170 GWh per year, fed by a 17.3 km² reservoir. The plant is connected via three 225 kV transmission lines to the national grid: the transmission line Soubré-Buyo, Soubré-San Pedro and Soubré-Taabo.

The key technical indicators of the power plant are shown below:

Specifications of the power plant:				
Turbines	Manufacturer	Type	Rated Power	Rated flow
3	Alstom	Francis HLF250-LJ	93.93 MW	238 m ³ /s
Generator	Manufacturer	Type	Rated Power	Rated speed
3	Alstom	SF90-56	90 MW / 105.88 MVA	107.14 r/min
Specifications of the micro-hydro power plant:				
Turbines	Manufacturer	Type	Rated Power	Rated flow
1	Alstom	Bulb GZ4B068-WP	5.51 MW	50 m ³ /s
Generator	Manufacturer	Type	Rated Power	Rated voltage
1	Alstom	SFWG5360-28	6.7 MVA	6.6 kV

The relevant implementation dates:

Milestones	Dates
Approval of the environmental impact assessment by the Direction of Environment	February 2015
Approval of the environmental impact assessment by the ANDE decree n°0078	21-August-2015
Commissioning of G1	25-May-2017
Commissioning of G2	23-August-2017
Commissioning of G3	25-October-2017
Commissioning of G4	28-November-2017

The project facilities include a 1,730 ha reservoir delimited by a 4.5 km dam with a maximal height of 19.5 m along Sassandra river, in the vicinity of the Nawa falls. It makes full use of the total 42 m denivelation of the natural falls, and also benefits from the regulated inflows from Buyo existing reservoir, built in 1978 and located 90km upstream. The expected operational lifetime of the project equipment is 30 years.

During the fifth period from 1st July 2023 to 31 December 2024 the project reduced 1,300,333 tCO_{2e} for a total amount since commissioning of 6,267,732 tCO_{2e}.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	25-May-2017 – 24-May-2027	VCS	Tuev Nord Cert GmbH (Tuev Nord)	10 years
Verification 1	25-May-2017 – 30-June-2020	VCS	4KEARTHSCIENCE	3.1 years
Verification 2	01-July-2020 – 30-June-2021	VCS	4KEARTHSCIENCE	1 year
Verification 3	01-July-2021 – 30-June-2022	VCS	CARBON CHECK (INDIA) PRIVATE LIMITED	1 year
Verification 4	01-July-2022 – 30-June-2023	VCS	4K Earth Science	1 year
Verification 5	01-July-2023 – 31-December-2024	VCS	4K Earth Science	1.5 year

1.3 Sectoral Scope and Project Type

Sectoral scope ¹	1
Project activity type	Energy (renewable/non-renewable)

1.4 Project Proponent

¹ Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

Organization name	CI-ENERGIES
Contact person	M. Noumory SIDIBE
Title	General Manager
Address	01 BP 1345, Abidjan, 1345 Côte d'Ivoire
Telephone	+225 20 20 62 01
Email	secretariatdg@cinergies.ci

1.5 Other Entities Involved in the Project

Organization name	AERA Group
Role in the project	Carbon consultant and trader
Contact person	Alexandre Dunod
Title	COO
Address	28 cours Albert 1er, 75008 Paris
Telephone	+33 6 42 96 09 78
Email	a.dunod@aera-group.fr

1.6 Project Start Date

Project start date	25-May-2017 ²
Justification	When the renewable electricity production to the grid started, with the commissioning of the first generator.

1.7 Project Crediting Period

Crediting period	☐ Seven years, twice renewable ☒ Ten years, fixed ☐ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
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² While 01-January-2017 was the initially expected and registered start date as per VCS-PD, actual commissioning (as evidenced) only occurred on 25-May-2017 following implementation uncertainties/delays hence the start date revision.

Start and end date of first or fixed crediting period

25-May-2017 to 24-May-2027

1.8 Project Location

The project is located about 5 km from Soubré village on the river Sassandra, San Pedro Province, Bas Sassandra region, Côte d'Ivoire. The geographical coordinates of the project extension limits are 5°48'33" W, 6°39'28" S (Northernmost point of the dam) and 5°46'56" W, 6°36'55" S (Easternmost point). The physical location of the project is shown in Figure 1.

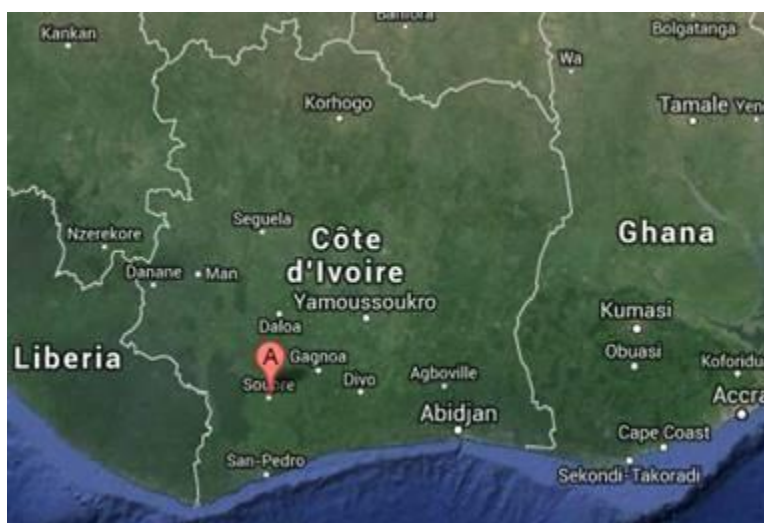


Figure 1 – The project location.

1.9 Title and Reference of Methodology

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version
Methodology	ACM0002	Grid-connected electricity generation from renewable sources".	16.0
Tool	TOOL07	Tool to calculate the emission factor for an electricity system	5.0
Tool	TOOL01	Tool for the demonstration and assessment of additionality	7.0
Tool	TOOL03	Tool to calculate project or leakage CO2 emissions from fossil fuel combustion	02

Tool	TOOL27	Investment analysis	6.0
Tool	TOOL24	Common practice	03.1
Guidelines	Annex 11, EB 48	Guidelines for the reporting and validation of plant load factors	01

1.10 Double Counting and Participation under Other GHG Programs

1.10.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project activity under another GHG program?

☐ Yes ☒ No

1.10.2 Registration in Other GHG Programs

Was the project registered or seeking registration under any other GHG programs?

☒ Yes ☐ No

1.11 The project is simultaneously registered as a CDM Project activity under the UNFCCC (Project 10326)³; however it either claims emission reduction under the VCS program or under the CDM, never both. Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.11.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the *VCS Program Definitions* for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

1.11.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the *VCS Program Definitions* for definition of GHG-related environmental credit system.

☐ Yes ☒ No

³ <https://cdm.unfccc.int/Projects/DB/RWTUV1476171677.04/view>

1.11.3 Supply Chain (Scope 3) Emissions

Do the project activities affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

If yes:

Is the project proponent(s) or authorized representative a buyer or seller of the product(s) (goods or services) that are part of a supply chain?

☐ Yes ☐ No

If yes:

Has the project proponent(s) or authorized representative posted a public statement on their website saying, "Carbon credits may be issued through the Verified Carbon Standard project [project ID] for the greenhouse gas emission reductions or removals associated with [project proponent or authorized representative organization name(s)] [name of product(s) whose emissions footprint is changed by the project activities]."

☐ Yes ☐ No

1.12 Sustainable Development Contributions

Economically speaking, Côte d'Ivoire is among the Developing Countries. It ranks 171 of 199 countries on the Human Development Index (UNDP, 2014)⁴. The World Bank has estimated that 42.7% of Ivoirians live under national poverty line (World Bank, 2014)⁵. Reliability and coverage of electricity is one of the challenges to be faced by the country. It has increased over the past years, however the national coverage rate is still very low with only 33% of Ivorian locations connected (Ministry of Mining, Oil and Energy, 2012)⁶ and only 26% of households have access to electricity in December 2011 (Agence Ecofin, 2014)⁷.

In 2005, the decision to establish a Renewable Energy Directorate has set a distinctive hallmark in the official Renewable Energy development policy. The Electricity Code adopted by the Assembly in March 2014 should promote, among other, the development of the Renewable Energy sub-sector in Côte d'Ivoire; the set target being 15% by 2020.

⁴ [Human Development Report](#)

⁵ World Development Indicators. Retrieved from World bank website: data, Côte d'Ivoire. www.worldbank.org/

⁶ National seminar on Energy, November 2012 (in French: « Séminaire national sur l'énergie 2012 »). Ministry of Mining, Oil and Energy

⁷ Agence Ecofin, May 21st 2014, Retrieved from Agence Ecofin website: <http://www.agenceecofin.com/> , Article: "Côte d'Ivoire: only 26% of households are duly connected to the grid"

The project helps the country meet its increasing demand for power reliably in a cost-effective and environment-friendly manner. The implementation of the project activity contributes to sustainable development in Côte d'Ivoire. In particular, the project:

- diversifies sources for electricity generation and decreases dependence on imported energy sources, above all natural gas and fuel oil.
- supports the Ivorian's government to achieve the goal of accessible and adequate energy supply at competitive costs.
- increases employment opportunities to local people (more than 1,500 direct jobs (20% SINOHYDRO, 80% local) and 2,500 indirect expected during construction, and 50 permanent positions during operation of the project),
- improves the regional facilities through the implementation of new schools, health center and housing, in addition to the creation of a fishing area in the area where the project is located, opening a new revenue stream for local populations, and the development of agriculture and tourism (with the promotion of Nawa falls).
- includes state-of-the-art socio-environmental mitigation measures for an estimated cost of 50 billion F CFA (15% of total investment).

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
1	6.1	6.1.1 Proportion of population using safely managed drinking water services	Implemented activities to increase	During this monitoring period, there was no increase in the population likely to have access to water per locality, as all of the connections had been done during previous MP.	In total, there are 182,512 people likely to have access to clean water. But an increase of 112% in subscribers' volume between 2015 and 2023.
2	7.1	7.1.1 Proportion of population with access to electricity	Implemented activities to increase	During this monitoring period, no new localities have been electrified/connected to the grid	During overall project lifetime, there have 8 localities electrified.
3	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	2,152,158 MWh delivered to the grid during the monitoring period	In total, 10,373,646 MWh were delivered to the grid over the project lifetime : MP5 : 2,152,158 MWh MP4: 1,509,806 MWh MP3: 1,166,281 MWh MP2: 1,298,363.6 MWh MP1: 4,247,036.9 MWh

4	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project contributed to Emission Reductions amounting to 1,300,333 tCO ₂ e for this monitoring period	Total emission reductions for this project amount to 6,267,732 tCO ₂ e to date: MP5: 1,300,333 MP4: 912,224 MP3: 704,667 MP2: 784,467 MP1: 2,566,041
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1.13 Commercially Sensitive Information

There is no commercially sensitive information provided.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification

Stakeholder's consultations have been organized following the regulatory Ivorian laws regarding public consultation in the framework of Environmental Impact Assessment. A special care has been considered regarding the information, consultation and participation of stakeholders along the process. A Stakeholder consultation plan has been elaborated and its implementation has been done conjointly by project proponent, Tractebel Engineering France (a consultant company providing technical services to the project proponent) and the National Office for Technical Study and Development (BNETD).

A representative of Designated National Authority of Côte d'Ivoire, Mr Sylvain Amalaman, Environmental Impact Assessment study office chief has been designated to follow closely the implementation of the consultation process and has delivered an environmental license based on the conclusion that consultation requirements have been fulfilled.

Characteristics and identification of stakeholders consulted for the project are as follows:

- Populations and groups of population in the cities, villages and camps impacted by the project i.e.:
 - Villages and camps located within the area of the study zone defined above;
 - Villages and camps located close to the transmission line corridors;
 - People who own land and property on which the project will have impacts;

	○ People that use agricultural and or natural resources; ○ Migrants attracted by the project that expect to get a job; ○ Local populations that have special links and rights with the land; ○ Neighbouring villagers that can provide local workforce; • National and local administration authorities: ○ Mr prefect of Nawa region, prefect of Soubré's department; ○ Sub-prefect of sub-prefecture of Soubré and Oupoyo; ○ Soubré's municipality's chief; ○ Environmental Authorities from the government including DNA; ○ Traditional representatives including villages' chiefs, religious chiefs and tribes' chiefs; • Institutions: ○ Cooperatives, local organisations, NGOs and other groups; ○ Commercial and industrial enterprises; ○ Media; ○ National Park of Taï (PNT);
Legal or customary tenure/access rights	<i>As per stakeholders' consultation, there was no conflict regarding land tenure rights, as compensation was done to all impacted people.</i>
Stakeholder diversity and changes over time	<i>As per the list of invited stakeholders above, they were composed of diverse groups, whether gender as well as economic and social situation. There was no change overtime in the stakeholder groups.</i>
Expected changes in well-being	<i>The project impact positively the stakeholders' well-being as it provides renewable energy source.</i>
Location of stakeholders	<i>All stakeholders are located in Soubre.</i>
Location of resources	N/A.

2.1.2 Stakeholder Consultation and Ongoing Communication

Ongoing consultation	Since all stakeholders are located in Soubre (near the power plant), in case of a request, they can go to the project's site in order to have a physical meeting with PP.
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	Since there was no change in the project design, there was no need to consult stakeholders again.
Date(s) of stakeholder consultation	30-January-2013
Communication of monitored results	Not applicable as there was no other consultation meeting since validation.
Consultation records	There is a register of all the incoming mails which are classified according to their type, as follows: Request for visit, Request for help, Complaints, Request for visit, Invitation, Study visit, Information. During this monitoring period, project proponent received several mails but none of it was a complaint.
Stakeholder input	There was no input received since validation, since no need to change project design.

2.1.3 Free, Prior, and Informed Consent

Consent	The resettlement option considered is collective or group rehousing of village communities. Generally speaking, the majority of people surveyed in the project's direct impact zone opted for collective or grouped resettlement on a given site for households in the same locality. The choice is mainly that of the customary authorities of the villages affected by the project. It is also the wish of the majority of heads of households (75% of heads of households) interviewed individually. The continuation of agricultural activities is also an expressed choice.
Outcome of FPIC	<i>All impacted people were relocated and support for improving crop productivity were provided, as per EIA report.</i>

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
<i>No grievance received during this monitoring period</i>	There is a register of all the incoming mails which are classified according to their type, as follows: Request for

	visit, Request for help, Complaints, Request for visit, Invitation, Study visit, Information. Each type is color coded to make it easier to find them in the Excel file, for each year. During this monitoring period, project proponent received several mails but none of it was a complaint. Mails received during this monitoring period concerned : work request, help request, visit request, request for information, Invitations, and study visits. Although the register also records complaints received via telephone calls and face-to-face complaints, no such complaints were received.
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2.1.5 Public Comments

There was no public comment received from stakeholders outside of the 30-day public comment period. Thus, this is not applicable.

Summary of comments received	Actions taken
Not applicable	Not applicable

2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

Soubre hydropower plant is managed by CI-ENERGIES, the national company in charge of producing and transporting electricity, thus experienced in energy production projects all over the country.

2.2.2 Risk assessment

	Risk identified	Mitigation or preventative measure(s) taken
Natural and human-induced risks to stakeholders' wellbeing	No risk identified	As per EIA and latest ESMP report, there are no risk for stakeholders' wellbeing.
Risks to stakeholder participation	No risk identified	Since validation, there was no complaint from stakeholders regarding participation risk

Working conditions	<i>No risk identified</i>	All safety measures are provided at project site. Verified and confirmed during each audit.
Safety of women and girls	No risk identified	There are no complaint from women working at the power plant
Safety of minority and marginalized groups, including children	No risk identified	The project does not impact marginalized groups, as per EIA report.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk identified	As per EIA report, there are pollutants risk during the operation phase of the power plant.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified⁸	Mitigation or preventative measure(s) taken
Discrimination	No risk identified	As per grievance register, there is no complaint regarding discrimination.
Sexual harassment	No risk identified	No complaint was ever received related to any form of sexual harassment
Gender equity in labor and work	<i>No risk identified</i>	As per list of employees, women and man are both part of the operation team of the power plant.
Forced labor	No risk identified	Verified during each site visit
Child labor	No risk identified	Verified during each site visit
Human trafficking	No risk identified	Verified during each site visit

⁸ The identified risks and commensurate mitigation or preventative measure(s) for forced labor, child labor, and human trafficking, must be inclusive of staff and contracted workers employed by third parties.

2.3.2 Human Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	There are no indigenous people living around the project's site. Furthermore, Ivory Coast is part of ILO convention since 21.11.1960. As a public company, CI-Energies is aligned to the ratified conventions.

2.3.3 Indigenous Peoples and Cultural Heritage

Risks identified	Mitigation(s) or preventative measure taken
No risk identified	No indigenous people nor cultural heritage were present at project's site.

2.3.4 Property Rights

Risks identified	Mitigation or preventative measure(s) taken
No risk identified	There was no population relocation during this monitoring period

2.3.5 Benefit Sharing

Summary of the benefit sharing plan	There was no benefit sharing plan during this monitoring period as the plant is fully owned by CI-ENERGIES. Impacted population relocated before project implementation did not re-negotiated since 2013.
Benefit sharing during the monitoring period	N/A.

2.4 Ecosystem Health

	Risk identified	Mitigation or preventative measure(s) taken during the monitoring period
Impacts on biodiversity and ecosystems	No risk identified	As per ESMP of 2021, the project had at that time, completed 90% of the creation of a secure biodiversity zone with:

		- Acquisition and securing of the site identified as a conservation area since 2016; - Organization of an information and mobilization workshop for administrative and political authorities, community leaders of villages impacted by the project and training of 20 community relays in the last quarter of 2016; - Physical development of the conservation area in 2017; - Research, seed collection, pre-treatment, treatment and planting; - Capture and transfer of residual fauna before the flooding in March 2017; - Carrying out various thematic studies on flora and fauna and assessment of ecosystem services in progress; - Study, monitoring and control of the construction of an ecological hut for ecotourism completed; - Organization of periodic ecological monitoring mission 2018-2021 (4 days/quarter). The last monitoring mission took place on April 20, 2021.
Soil degradation and soil erosion	No risk identified	There was no soil degradation no soil erosion during this monitoring period
Water consumption and stress	No risk identified	No change in water consumption pattern during this monitoring period

2.4.1 Rare, Threatened, and Endangered species

Species or habitat	As per EIA report there is no impact on rare threatened and endangered species.
Areas needed for habitat connectivity	N/A

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	No risk identified	There is no impact on rare, threatened and endangered species as per EIA report.
Areas for habitat connectivity	No risk identified	No risk as there are no threatened species living in the project area.

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
N/A	N/A	N/A	N/A

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species	No risk identified	There are no invasive species living in project's site.

2.4.3 Ecosystem conversion

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	No risk identified	The project is not AFOLU

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

During this monitoring period, there was no change in the project design. The hydro power plant operated continuously, generating 2,152,158 MWh and avoiding 1,300,333 tCO₂.

Furthermore, there were no major events or shutdowns that could have had an impact on GHG emission reductions and monitoring. [The power plant operated normally without any problem.](#)

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation during this monitoring period.

3.2.2 Project Description Deviations

[already formalized and approved at previous verification]

Actual project capacity has been updated based on installed groups power capacity converted in mega-watts, i.e. $3 \times 105.88 \text{ MVA} \times 0.85 + 6.7 \text{ MVA} \times 0.8 = 270 + 5.354 = 275.354 \text{ MW}$ instead of $270 + 5.5 \text{ MW}$ as previously stated.

Related power density has been updated consequently to 19.98 W/m^2 . The deviation does not impact neither the applicability of the methodology, additionality nor the appropriateness of the baseline scenario.

[already formalized and approved at previous verification]

Ex-ante emissions reductions were calculated based on an estimated 'sold electricity' average of $1,170 \text{ GWh/y} \times 0.9$ (applying such 0.9 discount factor to conservatively account for auxiliary consumptions and losses from net power generation assumption of $1,170 \text{ GWh/y}$) at time of (CDM)PDD registration, which lowered expected emission reductions by 10%. However, such losses between gross power plant generation and delivery sub-station exports are actually less than 1%, and irrelevant to the emission reductions since already accounted in the net metered energy at substation anyway.

As per CDM Guidelines on assessment of different types of changes from the project activity, the deviation does not impact neither:

- The applicability of the methodology is still applicable – as the project remain a large-scale project activity thus methodology ACM0002 v16.0.
- Additionality: the deviation does not impact the additionality of the project activity since a 9% increase in annual power generation remains within the +/-10% sensitivity analysis range (which breaking point for power revenues stood at +34.2% in energy generation) thus project remains additional⁹.
- The appropriateness of the baseline scenario: The deviation does not impact continuation of practice for power generation in Côte d'Ivoire, which is fossil fuel-based consumption.

⁹ $(1+9\%)*(1+10\%) = 1.19$ i.e. $+19.9\% < 34\%$

3.3 Grouped Projects

The project activity is not a grouped project.

3.4 Baseline Reassessment

Did the project undergo baseline reassessment during the monitoring period?

☐ Yes ☒ No

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	ABL
Data unit	m ²
Description	Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m ²).
Source of data	Project site
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	For new hydro power plants, this value is zero.
Purpose of Data	Calculation of project emissions
Comments	This parameter is used to calculate the power density.

Data / Parameter	Cap _{BL}
Data unit	W
Description	Installed capacity of the hydro power plant before the implementation of the project activity.
Source of data	Project site
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	For new hydro power plants, this value is zero.
Purpose of Data	Calculation of project emissions

Comments	This parameter is used to calculate the power density. However, calculation of power density is not required for this proposed project activity (no reservoir).
Data / Parameter	$EF_{grid,CM,y}$
Data unit	t CO ₂ /MWh
Description	Combined margin CO ₂ emission factor for grid connected power generation in year y
Source of data	Calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”
Value applied	0.6042
Justification of choice of data or description of measurement methods and procedures applied	As per the “Tool to calculate the emission factor for an electricity system” step-by-step method described in B.6.1 above. The weighted average CM method (Option a) is used: $w_{OM} = 0.5$ and $w_{BM} = 0.5$ Côte d'Ivoire national grid is the project boundary of the project.
Purpose of data	Calculation of baseline emissions
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	CAP _{PJ}
Data unit	W
Description	Installed capacity of the hydro power plant after the implementation of the project activity
Source of data	Project site
Description of measurement methods and procedures to be applied	Determine the installed capacity based on manufacturer's specifications or commissioning data or recognized standards
Frequency of monitoring/recording	Once at the beginning of each crediting period
Value monitored	275,354,000
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of project emissions

Calculation method	-
Comments	This parameter is used to calculate the power density.

Data / Parameter	A _{PJ}
Data unit	m ²
Description	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full
Source of data	Project site
Description of measurement methods and procedures to be applied	Measured from topographical surveys, maps, satellite pictures, etc.
Frequency of monitoring/recording	Once at the beginning of each crediting period
Value monitored	13,778,000
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of the data	Calculation of project emissions
Calculation method	-
Comments	This parameter is used to calculate the power density.

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
Source of data	Electricity meter(s)
Description of measurement methods and procedures to be applied	This parameter should be calculated as difference between (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. 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 Meters will be installed at the substation of the hydro power plant to measure directly and continuously the electricity supply to (and, if any, import from) the grid. The metering instruments will be calibrated annually in accordance with manufacturers specifications. Accuracy class of the meters is 0.2								
Frequency of monitoring/recording	Continuous measurement and at least monthly recording								
Value monitored	<table><tr><th>Year</th><th>2023</th><th>2024</th><th>Total</th></tr><tr><td>EG_{facility,y}</td><td>718,292</td><td>1,433,866</td><td>2,152,158</td></tr></table>	Year	2023	2024	Total	EG _{facility,y}	718,292	1,433,866	2,152,158
Year	2023	2024	Total						
EG _{facility,y}	718,292	1,433,866	2,152,158						
Monitoring equipment	Electricity meter calibrated as per manufacturer’s requirements.								
QA/QC procedures to be applied	Cross check measurement results with records for sold electricity								
Purpose of the data	Calculation of baseline emissions								
Calculation method	-								
Comments	The information is provided monthly by CI-ENERGIES, and contradictorily reconciled with CIE off-taker at invoicing stage. The electricity generated and delivered by Soubré to the grid is monitored both at the hydropower plant departure and at the substation delivery points, through metering equipments with a respective accuracy of 0.2% all, and invoiced monthly to CIE based on the reconciled, signed joint readings of delivered net electricity (after transmission losses). The meters have been verified by the central direction of energy transport and telecommunications sub-direction maintenance / control department of CI-Energies between 27/12/2024 and 29/12/2024, valid until 28/12/2025. Previous verifications have been done between 15/12/2022 and 20/12/2022 valid until 14/12/2023 for G1, 15/12/2023 for G3 and 19/12/2023 for G2 & G4. As there was a delay in calibration of one year, and latest meters’ verification report shows a maximum error of less than								

	0.2% (maximum applicable error), thus, Thus, paragraph 366 (a) of CDM validation and verification standard for project activities version 03.0 is applied. Therefore, the applicable error of 0.2% was conservatively deducted for the period going from 01/12/2023 to 31/12/2024. All meters have been calibrated at installation and are annually tested by CI-Energie.
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4.3 Monitoring Plan

Monitoring of net electricity supplied by the project to the grid

The proposed project activity is connected via a transformer and a 33/225 kV transmission line to the national grid. The data to be monitored is the net electricity supplied to the grid.

The electricity delivered from Soubré HPP to the national grid is continuously monitored through metering equipment installed on the project site. The monitoring is based on real-time transmission of the generation data by means of a fully automatic data acquisition system (SCADA, reading gross energy metered at powerhouse units).

Staff watches the operation status of metering equipments daily on site. Furthermore, designated staff collects the daily indexes (net energy metered at point of delivery) and compiles the totals of measured electricity monthly and completes the corresponding record. These records are checked by the company administrator or supervisor and reconciled in CIE off-taker presence before signed consensual invoicing.

Monitoring Organisation

The project operator CI-ENERGIES takes the responsibility of the monitoring plan implementation, supervision of the monitoring process, the data measuring, collection and recording, QA/QC, audit and reporting.

The staff from technical and financial departments undertakes the monitoring tasks including watching metering equipments periodically, collecting electricity data and completing records, checking and analyzing the data, archiving relevant records, reporting to the CDM manager.

Metering equipment

One meter per group has been installed in the power house as well as at the delivery substation, totalling 8 devices.

Power meters at groups departure [power house]

	G1	G2	G3	G4
Make	Itron, Inc.			
ID n°	67008922	67008923	67008929	67008924
Model	SL764A081 / 2014			

Voltage	3X57,7/100V
Current	1(2)A
Frequency	50Hz
Accuracy class	active 0.2S reactive 1
Operating span	48-240V DC / 57-415V AC

Power meters at groups feeders [delivery station]

	G1	G2	G3	G4
Make	Yantai Dongfang Wistom électric CO, ltd		WASION GROUP LIMITED	Yantai Dongfang Wistom électric CO, ltd
ID n°	201512000007	201512000008	1708417095000001	201512000002
Model	DTZ178, Triphasé 4 fils		DTSD341-9	DTZ178, Triphasé 4 fils
Voltage	3x220 (380)V; 3x57.7 (100)V; 3x100V		3x220 (380)V; 3x57.7 (100)V; 3x100V	3x220 (380)V; 3x57.7 (100)V; 3x100V
Current	1.5 (6)A; 5(10)A		1.5 (6)A; 1(2)A; 5(10)A; 0.3(1.2)A; 5(6)A	1.5 (6)A; 5(10)A
Frequency	50Hz		50 +/- 2.5Hz	50Hz
Accuracy class	active 0,2S reactive 1		active 0.2S réactive 1-2	active 0,2S reactive 1
Operating span	0.9Un-1.1Un		0.7Un-1.3Un	0.9Un-1.1Un

Testing/calibration

All meters have been calibrated at installation and are annually tested by CI-Energie.

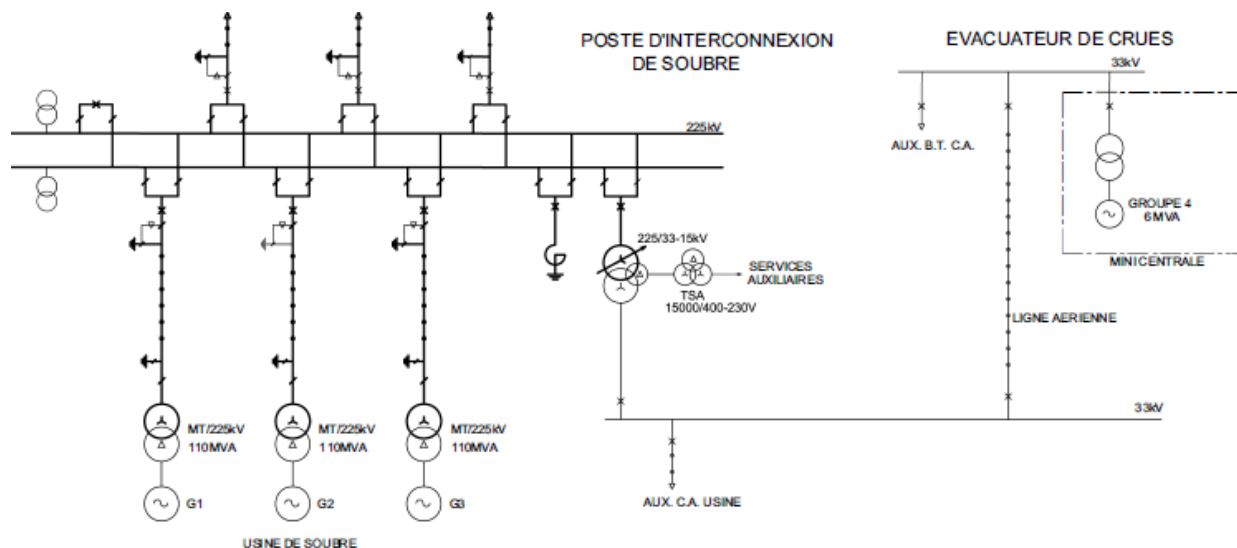
Quality assurance and quality control

The electricity delivered by Soubré HPP to the national grid is monitored through metering equipment at the project site. The data is cross-checked against records from the grid for quality control.

All relevant data records obtained from the monitoring will be kept by the project owner during the crediting period and for at least two years after for VVB's verification.

Internal auditing Internal auditing procedures are conducted by a dedicated team in charge of recording and reporting of the relevant data. All the data regarding energy production and consumption is then consolidated through signed energy reading sheets.

Line diagram



5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

Baseline emissions include only CO₂ 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:

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

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

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

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO₂/MWh).

Calculation of $EG_{pj,y}$

Since the project activity is “the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity”, it verifies the case of a Greenfield renewable energy power plant of the ACM0002 methodology Version 16.0 whereby:

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

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 CDM 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)

$EG_{facility,y}$ is therefore the quantity of net electricity supplied by the project plant to the Ivorian electricity grid . It is determined as a difference between (i) quantity of electricity supplied by the project plant to the grid and (ii) quantity of electricity delivered to the project plant from the grid (please refer to section B.7 for monitoring details). The methodology ACM0002 Version 16.0 assumes that all project electricity generation above baseline levels would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in $EF_{grid,CM,y}$.

Calculation of $EF_{grid,CM,y}$

According to the “Tool to calculate the emission factor for an electricity system” Version 05.0, the combined margin (CM) emission factor shall be calculated by applying the following six steps:

STEP 1: Identify the relevant electricity systems;

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

STEP 3: Select a method to determine the operating margin (OM);

STEP 4: Calculate the operating margin emission factor according to the selected method;

STEP 5: Calculate the build margin (BM) emission factor;

STEP 6: Calculate the combined margin (CM) emission factor:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times \omega_{OM} + EF_{grid,BM,y} \times \omega_{BM}$$

Where:

ω_{OM} is the weighting of operating margin emissions factor (%)

ω_{BM} is the weighting of the build margin emissions factor (%)

$EF_{grid,BM,y}$ is the Build margin CO₂ emission factor in year y (tCO₂/MWh)

$EF_{grid,OM,y}$ is the Operating margin CO₂ emission factor in year y (tCO₂/MWh)

Where the weights W_{OM} and W_{BM} , by default, are 50 % (i.e. $w_{OM} = w_{BM} = 0.5$) as mentioned in the “Tool to calculate the emission factor for an electricity system” (version 04.0.0) 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.

$$EF_{grid,CM,y} = 0.6042 \text{ tCO}_2/\text{MWh}$$

As the project don't lead to any emissions, the emission reductions of the project equal to baseline emissions for year y , thus $ER_y = BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$

	$EG_{PJ,y}$	$EF_{grid,CM,y}$	BE_y
	MWh	(tCO ₂ e/MWh)	tCO ₂
From 01/07/2023 to 31/12/2023	718,292	0.6042	433,992
From 01/01/2024 to 31/12/2024	1,433,866	0.6042	866,341
Total	2,152,158	-	1,300,333

5.2 Project Emissions

Project emissions shall be accounted by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y = Project emissions in year y (tCO₂e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (tCO₂/yr)

$PE_{GP,y}$ = Project emission from the operation of geothermal power plants due to the release of non-condensable gases in year y (tCO₂/yr)

$PE_{HP,y}$ = Project emission from water reservoirs of hydro power plants in year y (tCO₂/yr)

Project emissions from fossil fuel consumption ($PE_{FF,y}$)

No project emissions are expected as the project activity only involves renewable electricity generation from the run-of-river hydroelectricity power plant without fossil fuel consumption, and according to para 31 of ACM0002 “for all renewable energy power generation activities, emissions due to the use of fossil fuels for the backup generator can be neglected, hence $PE_{FF,y} = 0$.”

Project emission from the operation of geothermal power plants due to the release of non-condensable gases ($PE_{GP,y}$)

Project is hydro power plant hence inapplicable and $PE_{GP,y} = 0$.

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

The power density (PD) is calculated as follows:

$$PD = \frac{Cap_{PJ} - Cap_{BL}}{A_{PJ} - A_{BL}}$$

Where:

PD = Power density of the project activity (W/m^2)

Cap_{PJ} = Installed capacity of the hydro power plant after the implementation of the project activity (W)

Cap_{EL} = Installed capacity of the hydro power plant before the implementation of the project activity (W). For new hydro power plants, this value is zero

A_{PJ} = Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full (m^2)

A_{BL} = Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m^2). For new reservoirs, this value is zero.

Installed capacity is 275,354,000 W and expected reservoir area, net of the original river bed, is 17,300,000 – 3,522,000 = 13,778,000 m^2 (BNETD topographical analysis, 2014). Therefore the resulting power density is:

$$PD = 275,354,000 / 13,778,000 = 19.98 W/m^2 > 4 W/m^2$$

For hydro power project activities that result in new single or multiple reservoirs and hydro power project activities that result in the increase of single or multiple existing reservoirs, project proponents shall account for CH_4 and CO_2 emissions from the reservoirs, estimated as follows:

According to para 39: “if the power density of the project activity is greater than 10 W/m^2 , $PE_{HP,y} = 0$ ”.

Consequently $PE_{HP,y}$ is not monitored.

5.3 Leakage Emissions

According to ACM0002 version 16.0, no leakage emissions are considered. The emissions potentially due to activity such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

Emission reductions were calculated with the following formula:

$$ERy = BEy - PEy$$

Vintage period	Baseline emissions (tCO ₂ e)	Project emissions (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Reduction VCUs (tCO ₂ e)	Removal VCUs (tCO ₂ e)	Total VCUs (tCO ₂ e)
01-July-2023 to 31-Dec-2023	433,992	0	0	433,992	0	433,992
01-Jan-2024 to 31-Dec-2024	866,341	0	0	866,341	0	866,341
Total	1,300,333	0	0	1,300,333	0	1,300,333

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
01-July-2023 to 31-Dec-2023	353,457	433,992	23%	This is due to (i) equipments availability (thanks to good maintenance), (ii) increasing power demand from the grid, and (iii) upstream water releases from Buyo dam (due to inoperational group). The difference does not impact the project additionality as the breaking point for power revenues stood at +34.2% in energy generation.
01-Jan-2024 to 31-Dec-2024	706,914	866,341	23%	This is due to (i) equipments availability (thanks to good maintenance), (ii) increasing power demand from the grid, and (iii) upstream water releases from Buyo dam (due to inoperational group). The difference does not impact the project

				additionality as the breaking point for power revenues stood at +34.2% in energy generation.
Total	1,060,371	1,300,333	23%	This is due to (i) equipments availability (thanks to good maintenance), (ii) increasing power demand from the grid, and (iii) upstream water releases from Buyo dam (due to inoperational group). The difference does not impact the project additionality as the breaking point for power revenues stood at +34.2% in energy generation.

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

There is no commercially sensitive information provided in this monitoring report.

APPENDIX 2: <LIST OF EMPLOYEES>

Liste of employees_DOMP_ Soubre Hydroelectric power plant				
N°	Matricule	Job title	Gender	Type of contract
01	05327Q	Contremaitre Contrôle Commande	M	Permanent CDI
02	05261T	Agent Technique Maintenance Mécanique	M	Permanent CDI
03	05654W	Agent Technique Principal administratif, Logistique et Stock	F	Permanent CDI
04	03136L	Agent Technique Exploitation	M	Permanent CDD
05	05320H	Agent Technique Maintenance Mécanique	M	Permanent CDI
06	05321J	Agent Technique Exploitation	M	Permanent CDI
07	05358Z	Agent Technique Exploitation	M	Permanent CDI
08	03139P	Agent Technique Exploitation	F	Permanent CDD
09	03141R	Agent Technique Exploitation	M	Permanent CDD
10	03142S	Agent Technique Exploitation	F	Permanent CDD
11	05323L	Agent Technique Maintenance Electrique	M	Permanent CDI
12	05259R	Contremaitre Principal Maintenance Electrique	M	Permanent CDI
13	05322K	Agent Technique Exploitation	M	Permanent CDI
14	03143T	Agent Technique Exploitation	M	Permanent CDD
15	03144V	Agent Technique Exploitation	M	Permanent CDD
16	05265Y	Chef de Centrale de Soubré	M	Permanent CDI
17	03145W	Agent Technique Maintenance Mécanique	F	Permanent CDD
18	05113H	Chauffeur	M	Permanent CDI
19	05332W	Contremaitre Génie Civil et Auscultation	M	Permanent CDI
20	05134F	Chauffeur Coursier	M	Permanent CDI
21	03147Y	Agent Technique Maintenance Electrique	M	Permanent CDD
22	03149A	Agent Technique Exploitation	M	Permanent CDD

23	05269C	Ingénieur Génie Civil et Auscultation	M	Permanent CDI
24	05330T	Agent Technique Exploitation	M	Permanent CDI
25	05328R	Contremaitre Maintenance Mécanique	M	Permanent CDI
26	05331V	Agent Technique Bureau des Méthodes	M	Permanent CDI
27	05260S	Contremaitre Principal Maintenance Mécanique	M	Permanent CDI
28	05361C	Agent Technique Exploitation	M	Permanent CDI
29	05683C	Ingénieur Exploitation	M	Permanent CDI
30	03150B	Agent Technique Exploitation	M	Permanent CDD