ZANO-SOURI SOLAR POWER

Document Prepared by AERA Group

on behalf of Quadran Burkina Faso and Dedougou Solaire

Project Title	*Zano-Souri solar power*
Version	*1.0*
Date of Issue	*11-April-2023*
Prepared By	*AERA Group*
Contact	*28 Cours Albert 1er, 75008 Paris, France* *Ph +33 1 42 18 02 02 I Fax +33 1 43 25 80 06* *www.aera-group.fr*

CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Project

The bundled project consists of the construction and operation of two greenfield solar power plants, Zano for 24MWc and Souri for 18MWc. Zano is located near the town of Tenkodogo, in Bougou region, Center- Eastern Burkina Faso and will be operated by Quadran Burkina Faso, when Souri is located near Dedougou, in the Mouhoun region, Western Burkina Faso and will be operated by Dédougou Solaire. Both involve the setting up of photovoltaic (PV) panels for a total installed capacity of 42MWc which will capture solar energy and produce electricity to be exported to the West African Power Pool.

Access to clean and inexpensive energy is a priority of Burkina Faso's Ministry of Energy, which aims to increase the national and rural electrification rates by 45% and 19% respectively by 2025. To this end, the Government of Burkina Faso has signed a concession agreement with Quadran International (now rebranded Qair), Syscom Network (the sponsors) on one hand, and Quadran Burkina Faso and Dedougou solaire on the other hand (the project SPV's) to build and operate Zano and Souri respective solar power plants during 25 years.

The project is a type I project activity under sectoral scope: 1, Energy Industries (renewable and non-renewable sources). The methodology ACM0002 (Version 21.0) is applied since its purpose is the installation of a new grid-connected renewable power plant (Greenfield) as the "electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants."

The average power generation of the project for the next 7 years is estimated at 80 GWh per year, resulting in emissions reductions of 45,316 tCO2e emission reductions per year and 317,217 tCO2e of emission reductions over the 7 years crediting period.

Through the National Economic and Social Development Plan (PNDES 2016-2020), the government of Burkina Faso plans to fill the energy gap. Indeed, the latter underlines its ambition to increase the share of renewable energies in the energy mix to promote the country's self-sufficiency.

Indeed, the solar potential of the Burkinabe territory allows SONABEL to consider a unique solution to the energy deficit. In fact, the country has a solar irradiation of about 5.5%. kilowatt hours per square meter per day. This results in a better match between the production and the maximum demand on the grid, the hybrid solution will bring also additional support to the network operator.

Table 1: Implementation timeline

	Zano	Souri
Environmental Assessment Study	June 2020	January 2019
Producing License	April 2020	April 2020

Environmental clearance certificate	August 2020	July 2020
PPA signature	November 2019	June 2019
Expected commissioning	25 July 2023	

Prior to the implementation of the project, the existing scenario consisted in power generation and imports from SONABEL existing grid mix, mainly composed of fossil-fuel and hydropower sources.

1.2 Sectoral Scope and Project Type

The sectoral scope is Scope 1 – Energy Industries (renewable - / non-renewable sources)

ACM002 Grid connected renewable electricity generation from renewable sources - Version 21.0

The project is a renewable energy type and is not a grouped project.

1.3 Project Eligibility

The project is eligible under the scope of the VCS program version 4.3 because:

- It results in CO_2 emission reductions, one of the six Kyoto protocol greenhouse gases
- It is supported by methodologies approved under a VCS approved GHG program
- The project activity, grid-connected electricity generation using (large scale) solar power in a Least Developed Country, is not excluded as per para 2.1.1 of the VCS Standard v4.4.

1.4 Project Design

☐ The project includes a single location or installation only

☒ The project includes multiple locations or project activity instances, but is not being developed as a grouped project

☐ The project is a grouped project

The project has been designed to include two installations in two different locations, but only as a bundled project, not a grouped project.

Eligibility Criteria

N/A as not a grouped project.

1.5 Project Proponent

Organization name	Quadran Burkina Faso
Contact person	Bruno BARITELLO
Title	Managing Director / Country Director
Address	Projet ZACA Ouagadougou, BURKINA FASO
Telephone	+226 65 89 92 75 / 25 33 33 77
Email	b.baritello@qair.energy

Organization name	Dedougou Solaire
Contact person	Bruno BARITELLO
Title	Country Director
Address	Projet ZACA Ouagadougou - BURKINA FASO
Telephone	+226 65 89 92 75 / 25 33 33 77
Email	b.baritello@qair.energy

1.6 Other Entities Involved in the Project

Organization name	AERA Group
Role in the project	Carbon advisors & traders
Contact person	Alexandre Dunod
Title	COO
Address	28 cours Albert 1er, 75008 Paris, France
Telephone	+33 1 42 18 02 02
Email	a.dunod@aera-group.fr

1.7 Ownership

The legal right to control and operate the project activity of Zano belongs to Quadran Burkina Faso as per PPA 20 November 2019 and the project activity of Souri belongs to Dedougou Solaire as per PPA dated 07 June 2019.

1.8 Project Start Date

The project start date is 25th July 2023 as the expected date of Zano commissioning.

1.9 Project Crediting Period

From 25th July 2023 to 24th July 2030. 7 years renewable twice.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

The estimated annual GHG emission reductions/removals of the project are:

☐ <20,000 tCO_2e/year

☒ 20,000 – 100,000 tCO_2e/year

☐ 100,001 – 1,000,000 tCO_2e/year

☐ >1,000,000 tCO_2e/year

Project Scale	
Project	X
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
From May 1st 2023	23,232
2024	47,142
2025	46,883
2026	46,624
2027	46,368
2028	46,114
2029	45,860
Until April 30th 2030	14,994
Total estimated ERs	317,217
Total number of crediting years	7

Average annual ERs	45,316

1.11 Description of the Project Activity

The proposed projects consist of setting-up 54,572 solar PV modules in Zano and 32,760 solar PV modules in Souri (total capacity of 42MWp) connected to the West African Power Pool, for Zano at Zano substation (33kV), and for Souri grid at the new Dédougou substation (33kV). This clean energy supply thus implies a substantial reduction in the production of carbon from the predominantly thermal-based grid mix, thereby reducing the associated greenhouse impact upon the atmosphere.

The monitoring equipment is composed of four bi-directional Landis+Gyr ZMD405 meters for import/export (class 0.5S, one main and one check for Zano as well as Souri) located at Point of Connection at Nampower's Gobabis Substation (11kV cable end termination) as well as two bi-directional Landis+Gyr ZMD402 class 0.2 meters within the PV plant's Zano and Souri inverter premises for control purposes.

The main elements of the solar power plant are:

- 43 960 Modules: LONGI LR5-72HPH- 545M/550M ;
- 396 Trackers: PVH Axone-DUO
- 88 Inverters : SUNGROW250HX
- 3 Transformers station: SUNGROW MVS6750 – 33KV/0.8KV

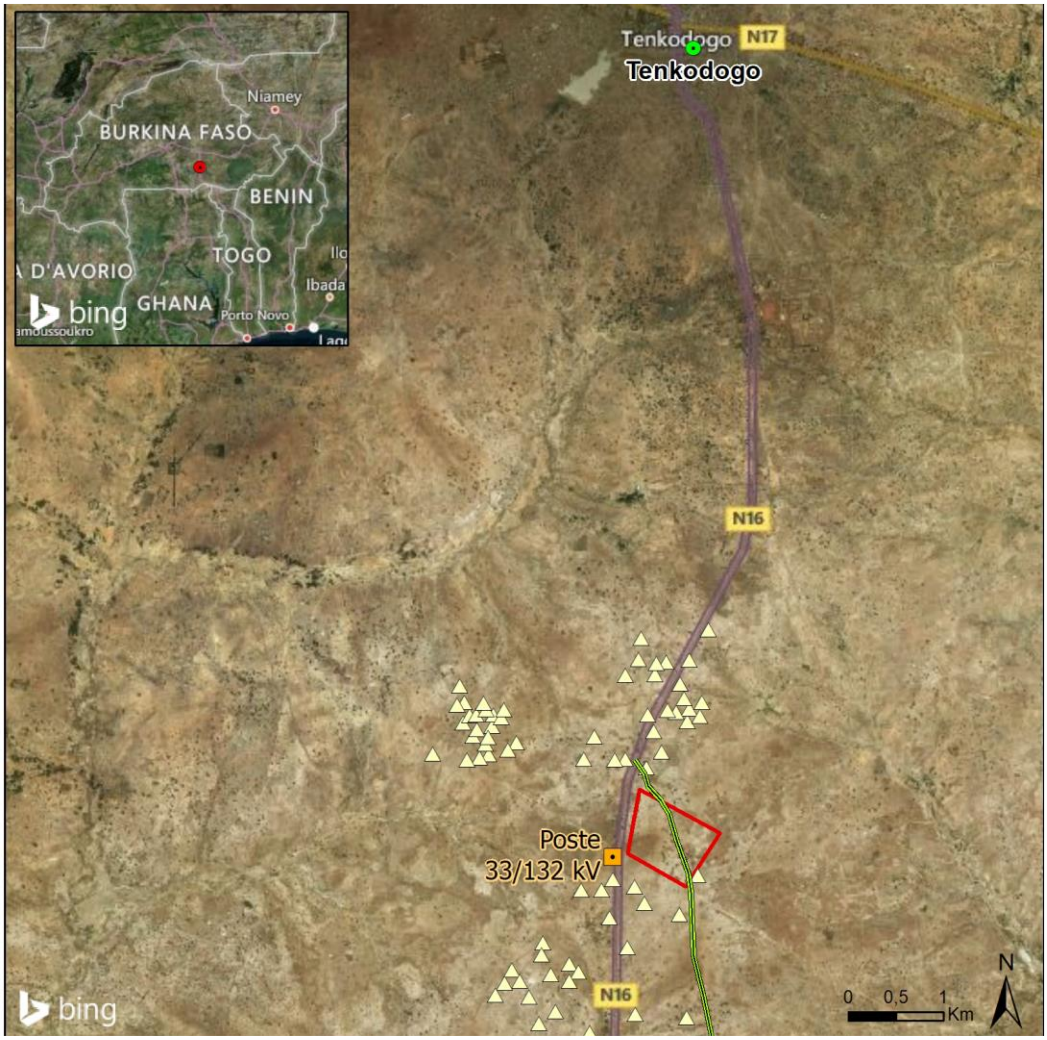
The solar panels specifications are detailed below:

Make	Longi
Model	LR5-72HPH 530~550M
Power	550 Wp
Max. voltage	49.80 V
Max. intensity	13.98 A
Efficiency	21.5 %
Lifetime	25 year warranty for extra linear power output

1.12 Project Location

Zano:

The Zano site is located about 140 km southeast of Ouagadougou in the locality of Zano, located in the department of Tenkodogo, Boulgou province, Centre-East region, Burkina Faso. The site covers an area of 63.56 hectares in flat surroundings. The direct right-of-way of the Project is shown on the following map. It should be noted that no buildings are on the Project site, but a sand track crosses it.

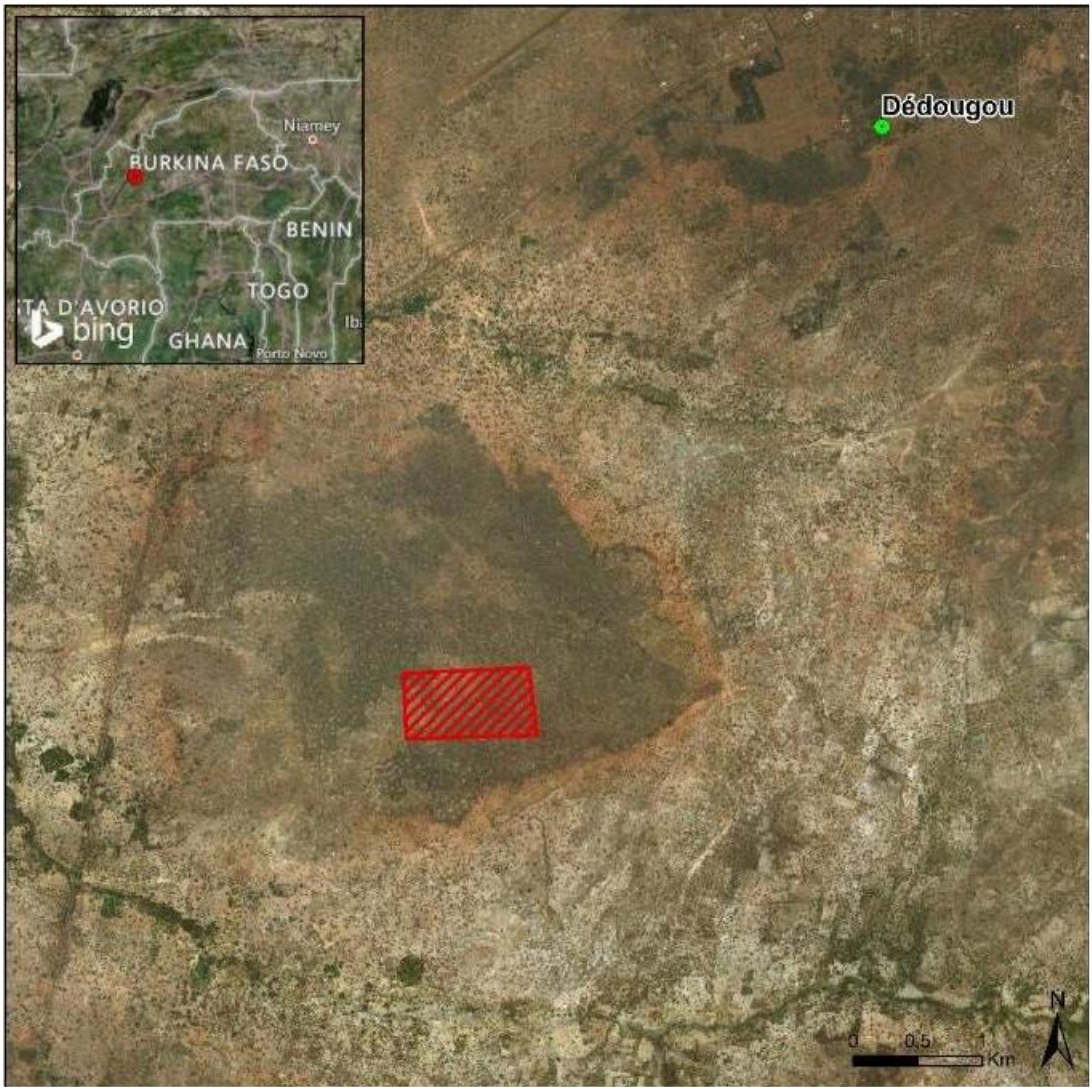


GPS coordinates: 11°42’132748”N ; 0°22’9444” W or decimal: 11.70368 ; -0.36929

Souri:

The project site is located approximately 250 km west of Ouagadougou in the locality of Souri, located in the department of Dédougou of the Mouhoun province in the Boucle du Mouhoun region of Burkina Faso. The site covers an area of 50 hectares on flat surroundings.

GPS coordinates: 12°27’33” N ; 3°28’3” W or decimal: 12.459167 ; -3.46750



1.13 Conditions Prior to Project Initiation

Please refer to Section 3.4 (Baseline Scenario).

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

To date, there are no regulations and policies preventing the implementation of the project activity. Burkina Faso has prioritized the development of its use of the renewable energy sector, as the country has huge potential for solar and wind energy. The establishment of a National Agency for renewable energies and energetic efficiency in December 2016 was the first step in the government's promotion of renewable energy. One of its main objectives is to reduce the country dependence to fossil fuel energy.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has not been, nor is seeking, registration under another GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by another GHG program.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

Does the project reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading?

☐ Yes ☒ No

The project does not reduces GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

Has the project sought or received another form of GHG-related credit, including renewable energy certificates?

☐ Yes ☒ No

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

Supply Chain (Scope 3) Emissions

A supply chain is a network of organizations (e.g., manufacturers, wholesalers, distributors, and retailers) involved in producing, delivering, and selling a product or service to the consumer. Scope 3 inventory emissions are all indirect upstream and downstream GHG emissions in an organization's supply chain. Carbon project activities may impact the emissions of goods and services in a supply chain and, therefore, Scope 3 emissions.

When completing a draft project description for the purpose of listing on the pipeline as under development*, complete the following information if the project impacts emissions associated with a good or service. Otherwise, delete this text, state this section is not applicable and explain why.*

Have the owner(s) or retailer(s) of the impacted goods and services[1] posted a public statement saying, "VCUs may be issued for the greenhouse gas emission reductions and removals associated with [organization name(s)] [name of good or service]" since the project's start date?

☐ Yes ☐ No

Explain your response.

Has the project proponent posted a public statement saying, "VCUs may be issued for the greenhouse gas emission reductions and removals associated with [name of good or service][describe the region or location, including organization name(s), where practicable]."

☐ Yes ☐ No

Explain your response.

Have the producer(s) or retailer(s) of the impacted good or service been notified of the project and the potential risk of Scope 3 emissions double claiming via email?

☐ Yes ☐ No

Explain your response.

In all other cases, demonstrate that a public statement(s) by the owner(s) or retailer(s) of the impacted good*(s)* or service*(s)* or project proponent (as applicable) has been made throughout the project crediting period. Where applicable, also demonstrate that the impacted good or service's producer(s) or retailer(s) have been notified of the project and the potential risk of Scope 3 emissions double claiming via email. Evidence of the public statement(s) and email(s) must be provided in this report or attached as an appendix.

1.17 Sustainable Development Contributions

The project is directly aligned with the pillars of the national sustainable development strategy of Burkina Faso:

Energy security and supply

The project will improve energy self-sufficiency of the country which is currently heavily reliant on imported fossil fuels. Burkina Faso currently uses about a third of its foreign exchange earnings for oil imports, making it not only highly vulnerable to international price fluctuations of hydrocarbons but also contributing to supply shortfalls, balance of payments and state

[1] Impacted goods and services are all goods and services directly impacted by the technologies and measures specified as project activities in the project description. Please see the VCS Program document *VCS Program Definitions* for additional information.

budget deficits. Renewable Energies are considered to address these issues as well as the country's demand for sufficient, best quality, sustainable and low-cost energy contributing to a more diversified energy mix.

Health

Local health conditions are improved as combustion of fossil fuels is avoided in the grid system resulting in less emission of PM2.5, NOx, and SO2, which cause negative health effects when inhaled. These health effects include premature death, acute respiratory illness, aggravated asthma, chronic bronchitis and decreased lung function.

Employment opportunities

The project will contribute to the local employment throughout its building and operation phases, creating opportunities for local construction workers, operation and maintenance technicians while salary levels (also of sub-contractors) will be verified continuously. It will also induce indirect employment by increasing the competitiveness of local industry from reducing the country's dependency on fossil fuels.

Technology transfer

This type of renewable energy project will assist building capacities in the country, through advanced technology transfer from industrialized countries. The project will introduce solar PV technology, methods and skills in Burkina Faso and demonstrate its applicability and efficiency, thus widening its accessibility.

1.18 Additional Information Relevant to the Project

Leakage Management

Not applicable as the methodology ACM0002 version 21 considers no leakage for a greenfield solar power plant.

Commercially Sensitive Information

Indicate whether any commercially sensitive information has been excluded from the public version of the project description and briefly describe the items to which such information pertains.

Note - Information related to the determination of the baseline scenario, demonstration of additionality, and estimation and monitoring of GHG emission reductions and removals (including operational and capital expenditures) cannot be considered to be commercially sensitive and must be provided in the public versions of the project documents.

Further Information

Include any additional relevant legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information that may have a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 SAFEGUARDS

2.1 No Net Harm

The assessment is the same for both projects:

Ref.	Potential Impacts	Actions/Mitigation/Follow-up	Implementation schedule work	Responsibilities	Objectives	Monitoring indicators	Frequency of follow-up	Estimated Cost
E1	**Waste management**							
E1.1	Management of waste domestic and industrial	■ Implement the waste management plan that will identify waste disposal channels for each type of waste that will comply with Burkinabe regulations and international best practices. ■ In particular, the issue of recycling photovoltaic panels will be evaluated. ■ The control measures will be recorded in a Waste Management Plan ■ Waste transport vehicles will be in good condition, maintained, and operators trained ■ Subcontractors used will be approved by the operator ■ One or more waste disposal facilities will be selected	During the entire life span of the project	Manager HSE of the operator	Zero loss of containment during the storage and transport of waste Minimize the volumes of waste products	Number incidents of loss of containment Volume of waste domestic transported (register of loads)	Monthly during the phase of construction	Included in costs of operation
E2	**Operating activities**							

E2.1	Health-Security of communities	■ Deploying a 24/7 guarding system for the different work areas. ■ Avoid any risk of fire with the presence of a firewall around the building of the sites by maintaining a low vegetation, fire extinguishers in the technical premises and the machines, and an appropriate storage of the flammable products. ■ Recruit a CLO and a Health Specialist-Safety-Environment (HSE); ■ Implement the code of conduct taking into account the Health-Safety-Environment (HSE) aspects, the respect of local customs and gender; ■ Train/educate employees on the code of conduct, before they start work, and periodically throughout the project, and train the safety teams on relations with the local communities. ■ Organize campaigns for Awareness-raising on the prevention of STIs, including HIV/AIDS, unwanted pregnancies and HSE aspects: prevention campaigns on the subject in the villages and areas surrounding the Zano solar project site during the construction phase by a specialized NGO. ■ Evaluate the need for Boreholes to avoid pressure on water points, and periodic measurements of the water table. ■ Develop a device in case of deterioration of the security climate in the Project area	During the entire project life	Manager HSE of the operator	Zero accidents, no propagation of STIs following the influx of workers in the area, no additional pressure on resources and public infrastructure due to the Project	Training provided with the staff newly recruited from the site; Data from the surveys of health infrastructures; water table level	quarterly	Included in costs of operation

		and continuous communication with the armed forces in Tenkodogo and Dedougou to be informed in a timely manner of any suspicious movements that may target the Project ■ Implement a management plan for the ■ traffic and speed limit on access roads to the site to 30km/h						
E2.2	Health and safety of workers	■ Implement the Health, Safety and Security plan for workers and train all workers ■ Ensure the wearing of appropriate PPE, particularly when handling hazardous materials or waste and machinery ■ Clearly identify the areas of storage of hazardous materials or waste ■ Allow only workers trained and certified to work on electrical equipment ■ To have the systems of stop automatic switches placed in the stations allowing automatic shutdown and warning of the control center in case of unusual overheating (fire) ■ The emergency vehicles will use the existing access roads allowing them to to access the closest points of the site ■ To provide means of fire-fighting equipment (appropriate extinguishers) placed at the transformers	Throughout the life of the project	HSE manager of the operator	Zero accidents and fire	Effective wearing of PPE, presence of fire extinguishers on site, signalling of dangerous products, operation of automatic shutdown systems	Continue	5M FCFA for a training program (already mentioned in the construction phase budget)

E2.3	Agriculture, Livelihoods and Ecosystem Services	■ Establishment of a livelihood restoration monitoring system, supporting the simplified database for registration and monitoring of PAPs, and resettlement monitoring indicators.	Throughout the life of the Project	Developer (Community Relations Officer (CLO), HSE manager and/or external consultant)	Verify that PAPs' livelihoods are restored	Livelihood level compared to pre-project level	Bi-annual to annual	Budget defined in the RSP
E2.4	Noise emissions	■ Implement the traffic management plan. ■ Ensure enforcement of appropriate speed limits for heavy vehicles to reduce noise. ■ Conduct a follow-up measurement of noise levels at the nearest receptor (the house located near the northeast boundary of the Project site), to ensure compliance with Burkinabe regulatory thresholds and IFC performance standards: by operating phase, over 24 to 48 hours (covering day and night) on an annual basis during the first two years of operation of the Project. ■ Extend the follow-up actions of the noise levels in case of non-compliance. Repeat the sound level measurement campaign in case of complaints from residents, or for any change in process (e.g. production capacity) or site configuration (e.g. addition of new equipment). ■ Implement the management system Grievances (see Project PEPP)	Throughout the life of the Project	HSE manager of the operator	LAeq, 1hr <55 dB(A) during the day and 45 dB(A) during the night and LAMax < 85 dBA for all receivers	N/A	N/A	Included in operating costs

E2.5	Air emissions	■ Regular inspection and maintenance of engines and generators to minimize air emissions. ■ Use of low-sulfur diesel fuel if locally available for backup purposes.	Throughout the life of the Project	HSE manager of the operator	Restrict air emissions from the Project	N/A	N/A	Included in operating costs
E2.6	Impacts on air quality and climate	■ Encourage the re-vegetation of the site by using the layer of topsoil removed during the construction phase; ■ Maintain low vegetation suitable for solar panels.	Throughout the life of the Project	HSE manager of the operator	Carbon offsetting of the Project's atmospheric emissions	N/A	N/A	Included in the compensatory reforestation plan to the extent of the area cleared
E3	**Employment and Procurement**							
E3.1	Employment and training opportunities	■ Provide Project-related employment opportunities for local people to the extent possible by including requirements for local hiring in construction contracts. The Operator and its subcontractors will hire and train local personnel to the extent possible.	Throughout the life of the Project	HR manager of the operator	Promote local employment	Number of local workers hired during the operation phase	Annually during the operation phase	Included in operating costs
E3.2	Opportunities to source local goods and services	■ The operator and its subcontractors will use local products and services whenever possible	Throughout the life of the Project	Purchasing manager of the operator	Promote the local economy	Percentage of construction budget spent locally	Monthly during the operation phase	Included in operating costs
E4	**Unforeseen / accidental events**							

E4.1	Accidental spills	■ Equipment, measures and procedures to prevent accidental oil spills ■ Hazardous Materials Management Plan ■ Establishment of an Oil and Chemical Spill Prevention and Response Procedure containing detailed procedures to follow in the event of accidental spill	Throughout the life of the project	HSE manager of the operator	Zero spills during storage and transportation of hazardous materials	Number of accidental spills	Monthly during the operation phase	Included in operating costs

2.2 Local Stakeholder Consultation

Zano:

SONABEL initiated consultation in 2016, when the site was first identified.

During the ESIA process, several consultations were held, first in August 2019, The first phase of consultations during the scoping phase allowed to inform the stakeholders about the project and the study (stages and activities, NIES schedule), to identify additional stakeholders to those pre-identified, to collect their opinions, expectations and fears, and, and overall to better understand the social context of the Project and its history.

The consultations conducted during the scoping exercise also made it possible, through the village committee representative, to mobilize the PAPs and other stakeholders in the village of Zano to make themselves available for

The consultations during the scoping exercise also provided an opportunity to mobilize PAPs and other stakeholders in Zano village to make themselves available for the next phase of the baseline study.

The consultations conducted during the initial status phase from October 20 to 30, 2019 made it possible to Identify PAPs and vulnerable households, inventory their assets affected by the Project (land, crops, trees), establish a socio-economic baseline for each affected household, identify and assess the environmental and social impacts of the Project on its environment the expectations and fears of the various stakeholders encountered and, in general, to better understand the environmental and social context of the Project.

The consultations also allowed to inform the stakeholders about the Project and the work schedule.

A restitution session of the main results of the NIES and the associated Summary Resettlement Plan was held in Zano on February 13, 2020 with the PAPs and local authorities in the presence of the promoter and SONABEL. This restitution allowed to:

1/ consulted PAPs on the main impacts identified and the associated mitigation measures proposed by the Project, and

2/ to sign individual compensation agreements with each of the PAPs

The invitation for the consultation were mostly done orally, as it is the tradition in Burkina Faso through radio announcement, public crier, and community leaders. Though the town council made a written announcement the week before the restitution meeting.

During the meetings the following comments were made by local stakeholders

Stakeholder	Concern / expectation	Suggestion / complaints expressed

PAP (men, women, youth, traditional authorities)	Involvement in the implementation of the Project	• Establish regular communication with the community on the progress of the Project, improve consultation with the PAPs; • Give priority to young people and women of the area in the recruitment for the realization of the works at the site; to stem the migration phenomenon towards the neighboring countries due to the lack of work locally, in particular among the young people; • More transparency in the allocation of financial compensation and for all PAPs (shadow areas felt in the compensation already paid by SONABEL in 2016), better consultation expected on the subject ; • Consideration of customary and communal authorities; • Comprehensive support for the populations on all social aspects in addition to financial compensation, particularly on conflict management and land (replacement land).
	Access to the benefits and spinoffs of the Project	• Building the capacity of youth and women; • Promote the availability and access to solar energy at the village level;
	Impact Management: Loss of agricultural, grazing, or non-timber forest product lands / Low availability of replacement lands in the vicinity of the Project site (20 km radius)	• Support PAPs with inputs to intensify production for those who have land outside the project site; Compensate for the losses suffered by the PAPs (especially for landowners: questions about the fair price of acquiring a hectare of land); • Support for livelihood restoration ; • To support women and youth in the implementation of IGAs, such as masonry, mechanics, welding, electric mills, sales kiosks, sewing, ironing, sale of fresh drinks, processing of non-wood products; • Negotiate the allocation of replacement lands with all parties concerned in a concerted and consensual manner. • Develop health and disease prevention centers, training centers for youth, schools.
PAP operator	Access to the	

	benefits and spinoffs of the Project	• Consider youth and women in recruitment; • Compensate for all losses (farm and NTFP)
	Impact management	Develop plots for the benefit of PAPs or failing that, grant them specific compensation for the loss of access to the land.
Representative of the family that owns the sacred site	Impact management	Perform two rituals before the start of construction and at the end of the construction phase; Proceed to the closing of the sacred site; To provide an access road to the site for the annual ritual performed by the family that owns the sacred property.
Landowners	Access to the benefits and spinoffs of the Project	Return a portion of the developer's profits to the landowners.
Communal authorities	Adhesion of the populations to the Project	Information/Communication/Sensitization of stakeholders on all the implications of the Project; Fulfill commitments to communities; Compensate for property losses and support PAPs in managing offsets.
NGO / CSO	Adhesion of the populations to the Project	Information/Communication/Stakeholder Awareness; NGO/CSO Implications; Make the energy produced available and promote its access at the local level.
Decentralized technical services	Restriction of access to the departmental road 36.	If possible, preserve the road infrastructure that is likely to be impacted (RD 36) or plan a change of route at the expense of the Project with the authorization of the Ministry of Infrastructure, Provide access to new grazing areas for breeders.
	Health of the populations: water and air pollution, loss of trees; Risk of pollution chemical too close to the houses,	Carry out the necessary environmental studies and investigations during the construction and operation phases; Provide for reforestation of certain areas to compensate for lost areas; Ensure the preservation of the environment through proper waste management.
		Take into account issues related to the safety of

	Risk of accidents related to traffic and construction activities	children such as: school fencing, traffic management.
	Specific consideration of vulnerable groups	Take gender into account in the design and implementation of the project; Provide specific consideration for the elderly, the sick and the disabled.
	Communication with stakeholders	Involve communal and customary authorities as well as deconcentrated technical services in the stakeholder engagement process; Ensure good communication with the communities well in advance of the construction of the Project.
	Resettlement and Livelihoods	Making alternative lands available to PAPs; Compensate for losses incurred; Strengthen the capacity of PAPs in animal husbandry techniques (fodder conservation, etc.); Organize vocational retraining activities for PAPs; Support communities in implementing IGAs.

The purpose of the NIES consultations to date has been to gather stakeholder information, comments and information about stakeholders and their comments and concerns about the Project. These consultations have answered stakeholder questions about the nature of the Project and the details of the of its design (to the extent that ERM had information at the time of the of the field mission). The information collected and the concerns of stakeholders were also incorporated into the NIES report

Souri

SONABEL conducted initial surveys in 2018, during which the Persons Affected by the Project (PAP) were identified with the aim of acquiring the land amicably and paying the compensation as required by Burkinabé regulations (see Deed of Transfer dated December 27, 2018 attached to the RSP). The landowners received compensation but the farmers did not receive compensation. They were allowed to continue to operate until the work began.

All of the PAPs identified were living in the village of Souri at the time.

Consultations during the NIES were conducted by the consulting firm ERM in partnership with Insuco SARL, a Burkinabè consulting firm, with stakeholders at the local, regional and national levels.

A delegation from SONABEL and the Ministry of Energy accompanied ERM and Insuco in the meetings and interviews in Dédougou and Souri during the scoping phase. The first phase of consultations during the scoping phase allowed the stakeholders to be informed about the

Project and the study (stages and activities, NIES schedule), to identify additional stakeholders to those pre-identified, to collect their opinions, expectations and fears, and overall to better understand the social context of the Project and its background.

The consultations carried out during the scoping phase also made it possible, via the representative of the village committee, to mobilize the PAPs and the other stakeholders present in the village of Souri so that they could make themselves available for the next phase of the study.

The consultations conducted during the baseline phase identified PAPs and vulnerable households, inventoried vulnerable households, to inventory their assets affected by the Project (land, crops, trees), to establish of each affected household, identify and assess the environmental and social impacts of the Project on its environment, to collect the expectations and fears of the various stakeholders encountered and, overall, to better understand the environmental and social context of the Project. The consultations also made it possible to to inform the stakeholders about the Project and the work schedule.

A restitution session of the main results of the NIES and the associated Summary Resettlement Plan was held in Souri on February 12, 2020 with the PAPs and local authorities in the presence of the promoter and SONABEL.

This restitution allowed to:

1/ consulted PAPs on the main impacts identified and impacts identified and the associated mitigation measures proposed by the Project, and

2/ to sign individual compensation agreements with each of the PAPs.

The invitation for the consultation were mostly done orally, as it is the tradition in Burkina Faso through radio announcement, public crier, and community leaders. Though the town council made a written announcement the week before the restitution meeting.

During the meetings the following comments were made by local stakeholders

Stakeholder	Concerns / expectations	Suggestions / complaints
PAP (youth, men, women, traditional authorities)	Involvement in the implementation of the Project Effective realization of the Project for the happiness and benefit of the local populations; Lack of infrastructure and health centers.	Promote the creation of jobs accessible to all locally; Contribute to the creation of jobs for young people, some of whom are forced to migrate for economic reasons to the gold mining sites of the region, and the realization of IGAs for the benefit of women, for example: masonry,

		mechanics, welding, electric mills, sale of cold drinks with refrigerators ; To pay special attention to women in the decision making process, in the information missions and in the realization of the Project activities; Favour consultation and information by integrating all the actors and parties concerned in order to reach solutions that are suitable for everyone; Compensate for and prioritize FMPs in Project activities whenever possible.
	Access to the benefits and economic spin-offs of the Project ;	Strengthen the capacities of youth and women Support women and youth to implement IGAs; To make solar energy available and accessible to the area of the populations affected by the Project.
	Management of socio-economic impacts on populations; Method of replacing impacted parcels; Lack of replacement land.	To accompany the PAPs in their economic and social integration. Compensate for losses incurred by PAPs. Support PAPs to restore their livelihoods.
Populations affected by the Project / Farmers	Access to the benefits and economic spin-offs of the Project ; Management of the socio-economic impacts of the Project.	Facilitate the relocation of operations - replace their impacted assets.
		Create jobs that are accessible to all. To make solar energy available and accessible to the populations affected by

		the Project.
		To make a consequent compensation to make up for the loss of earnings and to provide support by supplying equipment for market gardening and support in agricultural inputs (fertilizer, cart); Take into account the PAPs in the Project activities.
Landowners	Access to the benefits and economic spin-offs of the Project	Financial compensation (see PSR - compensation already made). Employment for communities.
Communal authorities	Adhesion of the populations to the Project ; Management of environmental impacts (pollution, noise, water resources, etc.) ; Cost and access to energy	To have a good communication and maintain a good collaboration between the actors (SONABEL, Commune and populations); Clearly inform the public about the ability or inability of the public to benefit from the Project and about the businesses that the public may be preparing to create; Identify the PAPs, develop sustainable support measures for them and establish the source of funding for this support; Set up a monitoring committee during the project to identify any difficulties experienced by the population; To set up and apply a management system for environmental impacts and

		in particular for the waste produced; Authorize and promote private connections.
	Access to the benefits and spinoffs of the Project Securing the site	Promote the creation of local jobs, especially for young people. Securing infrastructures at risk, particularly those at risk of electrical hazards; In securing populations, define and respect a safety radius between them and the site.
NGO/CSO	Adhesion of the populations to the Project ; Energy tariffs and access, long-term price trends; Environmental impact Appearance of social tensions	Compensate the population for their losses; Ensure access to energy for PAPs; To practice responsible and inclusive management of environmental and social impact issues, limiting the risk of social tensions; Accompany the populations in the planting of trees participating in the restoration of the environment; Propose solutions to relocate PAPs; Promote consultations with the residents of the site and all parties involved to identify their concerns and needs; Consider both priority issues, such as health, and secondary issues such as recreation; For lost fields and for displaced persons, allocate new fields to the affected

		persons; Gather concerns and suggestions from PAPs; Provide better support for PAPs.
Decentralized technical services	Management of impacts and risks related to the Project Physical Environment; Biological Environment; Social.	Identify PAPs, ensure they are reassigned The aim of the project is to ensure the physical and economic resettlement of these people, especially the vulnerable, and to provide them with better compensation and support and to give them priority in the implementation of IGAs; When the Project site impacts a grazing area, seek and propose an alternative site; Consult, sensitize and support stakeholders in building their capacity for forage production; Restore the impacted biological environment by planting more trees than those impacted by the Project. Provide a conservation and sustainable protection plan for these trees; In its realization, use quality and durable material for the Project; To take into account the needs of the populations on the subject of health training and infrastructures, to increase the positive impact of the Project in this sense.

		Provide access to electrical power (connections) to these health facilities To take into account the infrastructures of education and training by promoting the development of small local electrification units. To offer the possibility to these infrastructures to have small photovoltaic cells during the day; Provide grazing areas to replace those impacted; Diverting traffic corridors in the Project area or constructing livestock trails as needed

Grievance mechanism for both sites:

The grievance management mechanism is based on the following principles.

☐ Transparency and fairness: The grievance resolution process is transparent, culturally appropriate, and available in the appropriate language. The mechanism is designed in collaboration and partnership with communities. It explicitly assures potential users that the mechanism will not impede their access to other judicial or administrative remedies.

☐ Accessible and culturally appropriate: All stakeholders, including local community members and potentially vulnerable people, have access to the mechanism.

The mechanism is adapted to make it culturally appropriate (language, women's access) and accessible to vulnerable stakeholders.

☐ Regular and open communication:

- Written records: All grievances are recorded on a follow-up log;

- dialogue and site visits: All grievances are discussed with the complainant and, if necessary, a site visit to get a clear picture of the nature of the concern. The purpose of the site visit is to verify the validity and seriousness of the concern; and

- Timely resolution: The Project aims to resolve all concerns within a defined time frame.

On-going communication:

It is important to monitor stakeholder participation to ensure that consultation and disclosure activities are effective, including that key stakeholders, such as local communities, have been effectively consulted throughout the process.

Monitoring will be integrated with the environmental and social monitoring of the Project and will include:

☐ regular reporting on formal and informal consultation activities conducted with communities and government authorities;

☐ regular reporting on grievances received and their resolution; and

☐ a periodic internal audit of the implementation of the Stakeholder Participation Plan.

Reporting on the implementation of the PEPP will include

☐ documents disseminated: their type, frequency, and location;

☐ the location and date of formal participation events and the level of participation, including specific stakeholder groups

☐ the number and types of stakeholders contacted by mail, internet, and other means

communication channels;

☐ comments received by government authorities, village leaders, and other parties and forwarded to the Project;

☐ the number of comments by topic and type of stakeholder, and the detailed feedback provided; and

☐ the number and types of grievances and the nature and date of their resolution.

A stakeholder engagement report will be published annually, including a summary of issues raised by stakeholders, the number and topics of grievances, a summary of major key actions taken to address concerns, trend analysis in terms of key performance indicators, and engagement plans for the next period.

2.3 Environmental Impact

Environmental and social impact assessment were carried out in 2019 and 2020 for both projects.

Zano:

No Major impact is anticipated based on description of Project activities and nature of receptors. Most of the impacts (as the impact on air quality, noise emission, water resources, soil, biodiversity, landscape, land use, access) are Negligible or Minor after application of mitigation measures and their management should not expect other than implementation of sectorial best practice.

Expected magnitude of impacts per category, before and after mitigation are summarized in Table here-under

Subject to impact	Impact before mitigation	Residual impact
Air quality	Minor (construction)	Negligible
	Negligible (operation)	
	Positive (Greenhouse gas)	Positive
Noise	Moderate (construction)	Minor
	Minor (operation)	Negligible
Water resources (consumption)	Minor	Negligible
Water resources (drainage and erosion)	Moderate (construction)	Minor
	Negligible (operation)	Negligible
Water resources (accidental pollution)	Minor (construction)	Negligible
	Minor (operation)	
Soil	Minor (construction)	Negligible
	Negligible (operation)	
Biodiversity flora	Moderate (construction)	Minor
	Negligible (operation)	Negligible
Biodiversity fauna	Minor	Negligible
Landscape	Minor (construction)	Minor
	Minor (operation)	
Land use	Minor	Minor
Roads and access	Negligible (construction et operation)	Negligible
Agriculture, livelihood, local economy	Moderate	Minor
Community Health and Safety	Moderate (construction)	Minor
	Minor (operation)	Negligible
Workers Health and Safety	Moderate (construction)	Minor
	Negligible (operation)	Negligible
Waste management	Minor (construction)	Negligible
	Minor (operation)	
Trafic	Minor (construction)	Negligible

Souri:

One impact assessed as **Major** is anticipated on Agriculture and Livelihoods upon Project's construction phase. Sensitivity of receptors is high because land users were not compensated

for their loss (land access and farming). However, residual impact is minor after implementation of compensation process for land users (as defined in associated PSR).

Most of the impacts (as the impact on air quality, noise emission, water resources, soil, biodiversity, landscape and land use) are Negligible or Minor after application of mitigation measures and their management should not expect other than implementation of sectorial best practice.

Expected magnitude of impacts per category, before and after mitigation are summarized in Table here-under:

Subject	Impact before mitigation	Residual impact
Climate and Air Quality	Miner (construction)	Negligible
	Negligible (operation)	
Noise	Moderate (construction)	Minor
	Miner (exploitation)	Negligible
Water resources *(withdrawal)*	Miner (construction & operation)	Negligible
Water resources *(drainage and erosion)*	Moderate (construction)	Minor
	Moderate (operation)	Negligible
Water resources *(accidental pollution)*	Miner (construction & operation)	Negligible
Floors	Miner (construction)	Negligible
	Negligible (operation)	
Biodiversity Flora	Moderate (construction)	Minor
	Negligible (operation)	Negligible
Biodiversity Wildlife	Moderate (construction & operation)	Negligible
Visual Impact	Miner (construction)	Minor
	Moderate (operation)	
Land	Miner (construction & operation)	Minor
Agriculture, livelihood, and local economy	Major (construction & operation)	Minor
Health and safety of populations and workers	Moderate (construction)	Minor
	Negligible (operation)	Negligible
Infrastructure	Moderate (construction)	Negligible
	Negligible (operation)	
Waste	Miner (construction & operation)	Negligible
Cultural heritage	Miner (construction)	Negligible
	Negligible (operation)	
Traffic	Moderate (construction)	Minor
	Negligible (operation)	Negligible
Local employment	Positive	Positive
Immigration	Moderate (construction)	Negligible

	Negligible (operation)	
Ecosystem Services *Community Food and Livestock Feed*	Moderate	Minor
Ecosystem services *Collection of NTFPs*	Minor	Negligible
Ecosystem services *Existence value of biodiversity*	Negligible	Negligible
Ecosystem services *Aesthetic value*	Moderate	Minor

2.4 Public Comments

Public comment period ongoing.

2.5 AFOLU-Specific Safeguards

N/A as not an AFOLU project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The approved baseline and monitoring methodology selected for to the proposed project activity is: ACM0002 version 21.0 - Large –scale Consolidated Methodology: “Grid-connected electricity generation from renewable sources”

Standardized Baseline ASB0034-2021 – versions 1.0 “Grid emission factor for West African Power Pool” is also applied.

The methodology also refers to the latest approved versions of the following applied tools, which are:

- Methodological Tool: “TOOL01: Tool for the demonstration and assessment of additionality” (version 7.0.0);

- Methodological Tool: “TOOL05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 3.0);

- Methodological Tool: “TOOL07: Tool to calculate the emission factor for an electricity system” (version 7.0).

3.2 Applicability of Methodology

The choice of the ACM0002 methodology is accurate since the proposed project activity respects all the applicability conditions required.

Table 3: Compliance of the project activity project activity regarding ACM0002 applicability conditions

ACM0002 version 21.0 applicability conditions	Project activity applicability
This 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).	The project activity is greenfield solar power plants substituting electricity produced on the grid by renewable energy.
In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Integrate BESS with a Greenfield power plant; (b) Integrate a BESS together with implementing a capacity addition to (an) existing solar photovoltaic or wind power plant(s)/unit(s); (c) Integrate a BESS to (an) existing solar photovoltaic or wind power plant(s)/unit(s) without implementing any other changes to the existing plant(s); (d) Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or wind power plant(s)/unit(s).	The project activity does not involve the integration of BESS.
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.	The project activity is the construction and operation of two solar power plants hence the methodology is applicable.
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	The project activity does not involve any capacity additions, retrofits,

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.	rehabilitations or replacements.
In case of Greenfield project activities applicable under paragraph 5 (a) above, the project participants shall demonstrate that the BESS was an integral part of the design of the renewable energy project activity (e.g. by referring to feasibility studies or investment decision documents); (d) The BESS should be charged with electricity generated from the associated renewable energy power plant(s). Only during exigencies may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section 5.4.4 below. The charging using the grid or using fossil fuel electricity generator should not amount to more than 2 per cent of the electricity generated by the project renewable energy plant during a monitoring period. During the time periods (e.g. week(s), months(s)) when the BESS consumes more than 2 per cent of the electricity for charging, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period.	The project does not involve BESS
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/m2; 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/m2; 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	The project activity does not involve any hydro power plant.

equal to 4 W/m2, 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/m2; (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: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.	
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.	Not applicable, the project is not an integrated hydro power project as it concerns solar power plants.
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.	The proposed project activity neither involves: - 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, nor - biomass fired power

	plants/units.
In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	The project activity does not involve capacity additions, retrofits, rehabilitations or replacements.
In addition, the applicability conditions included in the tools referred to above apply.	Applicability conditions of the applied tools are justified underafter.

From the above, it is concluded that the project activity meets all the applicability conditions of the methodology ACM0002 version 21.0 "Grid connected electricity generation from renewable sources".

Table 4: Compliance of the project activity regarding applicability conditions of Standardized Baseline ASB0034-2021

No	Applicability condition	Applicability to this project activity
(a)	The project activity is implemented in any of the countries members of WAPP and is connected to the project electricity system;	The project activity is implemented in Burkina Faso, member of WAPP, and connected to the same electricity system.
(b)	The CDM approved methodology that is applied to the project activity requires the determination of CO2 emission factor(s) through the application of the grid tool;	As part of ACM0002, "operating margin" (OM), "build margin" (BM) and "combined margin" (CM) need to be estimated to calculate baseline emissions of the project activity.
(c)	The project activity uses ex ante option for the grid emission factor as indicated in the tool i.e. no monitoring and recalculation of the emissions factor during the crediting period is required	Ex-ante option for grid emission factor is applied in this project activity.

TOOL01: “Tool for the demonstration and assessment of additionality” (version 7.0) is also applicable since “Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory”.

TOOL05: “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 3.0) is also applicable as “referred to in [ACM0002 §68] methodologies to provide procedures to monitor amount of electricity generated in the project scenario”, since the following project scenario applies to the recipient of the electricity generated:

(a) Scenario I: Electricity is supplied to the grid.

The project activity also meets the following applicability conditions of TOOL07 “Tool to calculate the emission factor for an electricity system”. Version 7.0

Table 5: Compliance of the project activity project activity regarding applicability conditions of “Tool to calculate the emission factor for an electricity system” version 7.0

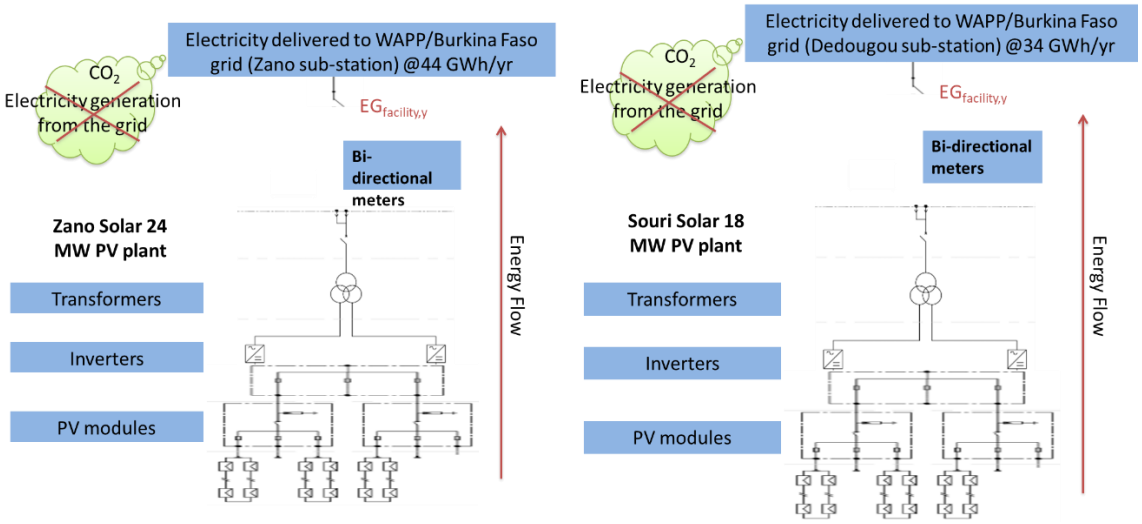
No	Applicability condition	Applicability to this project activity
1	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The project activity substitutes grid electricity by supplying renewable power to grid. Hence the tool is applicable.
2	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	The emission factor for the project electricity system is calculated for grid power plants only.

	(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.	
3	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.	Since the project electricity system is not located partially or totally in an Annex I country, the tool is applicable.
4	Under this tool, the value applied to the CO_2 emission factor of biofuels is zero.	No biofuels have been identified in the baseline grid emission factor determination

Other tools mentioned in the methodology are not applicable to this project activity.

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	CO2 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
Project	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants	CO_2	No	Minor emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source



3.4 Baseline Scenario

According to methodology ACM0002 and since the project is the installation of a new grid-connected renewable power plant the baseline scenario is the following:

"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 to calculate the emission factor for an electricity system."

So, continuation of current practice for power generation in Burkina Faso involves a significant share of fossil fuel consumption, including in capacity additions to meet the demand increase, as reflected by the Combined Margin emission factor of 0.573 tCO2/MWh referred in B.6.3.

According to Sonabel's website[2] , Burkina Faso has a production park of 325MW out of which 293MW based on thermal energy.

3.5 Additionality

According to the VCS Standard version 4.4 the start date of the project will be 25/07/2023 when Zano's site project start reducing emissions.

In accordance with ACM0002 methodology, the additionality of the project activity is demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" version 7.0.

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

This step is optional; it is not applied as it is considered that the proposed project activity is not the first-of-its-kind.

[2] https://sonabel.bf/a-propos/nos-activites/production/

Step 1: Identification of alternatives to the project activity

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

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

Outcome: alternative = operation of grid-connected power plants and by the addition of new generation sources (i.e. continuation of the current situation)

Sub step 1b: consistency with mandatory laws and regulations

The project complies with mandatory laws and regulations of the host country, i.e. Burkina Faso.

The following laws and regulations applies (among others, and selected as the most relevant)

- The environment code, law n°006-2013/ AN, 2 April 2013, the realization of the solar power plant absolutely requires its compliance with this law on the preservation of the environment.
- Law 014-2017/AN of April 20, 2017 on the general regulation of the energy sector aims to ensure an effective, efficient, reliable, sustainable, sufficient and perennial supply of energy in order to promote sustainable socio-economic development in Burkina Faso. This law regulates the production, transmission, distribution, operation, import, export, purchase and sale of electrical energy. This project for the construction and operation of a solar power plant had all the necessary authorizations from the Ministry of Energy before starting work.
  1)
- Law N° 053-2012/ AN on the general regulation of the electricity sub-sector in Burkina Faso

The purpose of this law is to ensure an efficient, adequate and sustainable supply of electricity in Burkina Faso in order to promote the country's sustainable socio-economic development. It applies to the generation, transmission, distribution, operation, import, export and sale of electricity by any natural or legal person on the national territory. It specifies the public service obligations in terms of providing basic services to users, security of supply, consumer protection, respect for the environment, etc. It also specifies the actors in the sub-sector and the pricing of electricity.

- Law n°20-2013/AN of May 23, 2013 on the legal regime for public-private partnerships in Burkina Faso

This is a medium- or long-term contract by which a private company is associated with the design, implementation and operation of public administration projects through the sharing of responsibilities, risks and benefits between the public and private partners. This partnership engages the expertise, creativity and innovation of the private sector while involving the State, the private sector and the citizen, consumer of the outputs (products or services) resulting from the partnership.

The overriding objective of PPPs is to achieve the greatest social and economic benefits through vigorous competition among private sector groups of builders, operators, financiers, engineers and various national and international stakeholders. PPP was signed on 5 April 2019.

Step 2: Investment analysis

Under step 2, it will be demonstrated that project activity is not economically or financially feasible, without the revenue from the sale of certified emission reductions

Sub-step 2a: Determine appropriate analysis method

Since the proposed project will generates other financial/economic benefits than CDM related income, the simple cost analysis method (Option I) is not appropriate. Also, investment comparison analysis method (Option II) is only applicable to projects whose alternatives are similar investment projects. Indeed, if the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate. Therefore, the benchmark analysis (Option III) is applied.

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

The financial/economic indicator identified as most suitable for the project type and decision context is the project Internal Rate of Return (post-tax Project IRR).

This indicator allows for effective comparison of the project returns with an appropriate benchmark. Therefore, the financial analysis is based on parameters that (a) are standard in the market and (b) consider the specific characteristics of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer. The benchmark represents the minimum rate of return that would justify the financial viability of the project and therefore its implementation.

Project IRR

In accordance with the "Methodological tool - Investment analysis" (Version 12), all input values were known before the investment decision and can therefore be considered realistic and appropriate values to be used in the financial calculation of the proposed project activity.

Table 8 – Parameters used in the investment analysis for (as of 08/09/2020 start date[3])

Zano			
Item	**Value**	**Unit**	**Source**
Installed capacity	24	MW	Project documentation, concession agreement/amendment,
Annual net power	48	GWh	Project's technical studies and Plant Load Factor ((a) as provided to banks and equity

[3] Financial close agreement & supply and installation contracts signature

generation			financiers)
Installation costs	24.037	Million EUR	EPC contract
Annual O&M costs	0.264	Million EUR	O&M agreement (excluding indexation)
Investment horizon	25	Years	Project financial model (as per PPA duration),
Expected power price	0.073	€/kWh	PPA (48 F.CFA/KWh),
Income tax	16%	% of earnings before taxes	25 year average applicable tax rate,

Souri			
Item	**Value**	**Unit**	**Source**
Installed capacity	18	MW	Project documentation, concession agreement/amendment,
Annual net power generation	37	GWh	Project's technical studies and Plant Load Factor ((a) as provided to banks and equity financiers)
Installation costs	20.662	Million EUR	EPC contract
Annual O&M costs	0.203	Million EUR	O&M agreement
Investment horizon	25	Years	Project financial model (as per PPA duration),
Expected power price	0.073	€/kWh	PPA (48 F.CFA/KWh),
Income tax	16%	% of earnings before taxes	25 year average applicable tax rate,

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

The IRR calculation compares the real IRR with a real benchmark which in both cases takes out the effects of general price increases due to inflation.

An adequate project benchmark is determined below following the Weighted Average Cost of Capital (WACC) method, based on parameters that are standard in the market since the Greenfield project activity could be undertaken by other promoters.

The Weighted Average Cost of Capital (WACC) is calculated as follows:

$$WACC = re \times We + rd \times Wd \times (1 - Tc)$$

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 (-)

As no typical debt/equity finance structure observed in the sector of the country is readily available, 50% debt and 50% equity financing is assumed as a default, therefore $w_d = w_e = 50\%$.

Cost of debt is assumed as the commercial lending rate in the country, since the benchmark is based on parameters that are standard in the market, and no documented cost of debt financing of comparable projects (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned) is available. The Burkinabe latest updated (07/10/2019) average commercial lending-debit rate from West African States' Central Bank statistics chosen, reflecting $r_d = 9\%$[4].

Cost of equity is determined among the default values for the expected return on equity provided in the tool 27 Methodological tool, investment analysis v12.0 date 2 November 2022 (Burkina Faso – Group 1), thus $r_e = 17.18\%$.

The applicable corporate tax is taken as per the Project financing assumptions displayed above, T = 0% for year 1 to 7 included.

Then T=15% for year 8 to 15

T=27.5% for year 16 to 25.

>> The calculated[5] WACC results in **12.54%**, higher than the Project IRR of 7.08% for Zano and 5.79% for Souri in the absence of carbon revenues.

Sub-step 2d: Sensitivity analysis

A variation of ±10% in the critical assumptions (i.e. total investment, annual O&M cost, and power sales revenues) is considered. The results are shown in the following table.

Table 9 – Sensitivity analysis; impact of variations in assumptions on the IRR without CDM revenues

Zano

[4] [https://www.bceao.int/sites/default/files/2020-03/CONDITIONS%20DE%20BANQUE%20DECEMBRE%202019.pdf] consulted July 2020

[5] $WACC = re \times We + rd \times Wd \times (1 - Tc)$ = 15.24% * 50% + 9% * 50% * (1 - 16%)

Percentage Variation	-10%	0%	+10%
Power sales revenues	5.31%	7.08%	8.76%
Annual O&M costs	7.37%		6.79%
Total CAPEX	8.02%		6.25%
Power generation	6.55%		7.08%

Souri			
Percentage Variation	-10%	0%	+10%
Power sales revenues	4.04%	5.79%	7.43%
Annual O&M costs	6.06%		5.51%
Total CAPEX	7.07%		4.71%
Power generation	5.26%		5.79%

The sensitivity analysis confirms that the project's IRR without carbon revenues is unlikely to meet the required benchmark of 12.54%.

Power generation is capped, thus an increase of 10% is not possible, thus no impact on IRR.

Such benchmark would only be exceeded for Zano if the sales revenues increase by 34%, or the investment costs decrease by 46%, which is unlikely given the fixed PPA and EPC terms. Even a decrease by 100% of operating costs would not make the project IRR breach the benchmark, which is out of probability.

Such benchmark would only be exceeded for Souri if the sales revenues increase by 44%, or the investment costs decrease by 39%, which is unlikely given the fixed PPA and EPC terms. Even a decrease by 100% of operating costs would not make the project IRR breach the benchmark, which is out of probability.

Outcome of Step 2

Therefore, it can be stated that the proposed project activity is unlikely to be financially/economically attractive (project IRR being lower than the benchmark).

Step 3: Barriers analysis;

Project proponent can use either investment analysis or barrier analysis step. As project proponents already apply the investment analysis it is not required to elaborate on barriers analysis.

Step 4: Common practice analysis.

The latest version 03.1 of the *methodological tool 24 Common practice* is applied:

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

From a project activity capacity of 42 MW, the applicable output range is calculated as **21 to 63 MW** of power generation capacity.

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

(a) The projects are located in the applicable geographical area **(Burkina Faso host country)**;

(b) The projects apply the same measure as the proposed project activity (**power generation based on renewable energy**);

(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 **(solar)**;

(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 **(21 to 63 MW)**; Zano (12-36 MW) Souri (9-27MW)

(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 **(04/2023)**.

In the host country of Burkina Faso, the **similar** power plants operating before the start date of the project and belonging to the 21-63 MW output range are[6]:

[6] https://www.arse.bf/spip.php?article31

Power plant	Year	Installed capacity	Technology	CDM
Zina Solar PV power plant	2014	22.78MW	Solar	Yes (project 10151)
Zagtouli PV	2017	33 MW	Solar	Yes (CPA 10320-P1-0003-CP1)
Off-grid Solar PV project at IAMGOLD Essakane SA Gold Mine	2018	15 MW	Solar off grid	Yes (Project 10398)
Nagréongo	2022	30MW	Solar	No but GS ID 10869
Kodeni	2023	38MW	Solar	Yes (project 10704, provisional)
PA				

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 N_{all}.

All the projects identified in Step 2 are registered CDM project activities, project activities submitted for registration, or project activities undergoing validation.

Therefore $\underline{N_{all} = 0}$

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 N_{diff}.

The technology used in the project activity is not different from **the similar activity** with regard to its energy source/fuel which is solar. Therefore $\underline{N_{diff} = 0}$.

Step 5: Calculate factor $F=1- N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

$F=1- \infty=\infty$

$N_{all} - N_{diff} = 0$

The proposed 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.

➔ Since F = ∞ and N_{all}-N_{diff} = 0, it can be concluded that **the project activity is not common practice** i.e. that its technology has not diffused in the relevant sector and region.

Outcome of Step 4:

Step 4 is satisfied, i.e. the proposed project activity is not regarded as "common practice". In conclusion of the overall additionality demonstration, the proposed project activity is deemed additional.

3.6 Methodology Deviations

N/A as no methodology deviation was used.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 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:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (4)$$

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 "TOOL07: Tool to calculate the emission factor for an electricity system" (t CO2/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 21.0 whereby:

$EG_{PJ,y} = EG_{facility,y}$ (5)

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 SONABEL 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 21.0 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 $EF_{grid,CM,y}$

Based on Standardized Baseline ASB0034-2021 Grid emission factor for West African Power Pool v1.0, the applicable grid emission factor value to calculate the emission reductions of the PV power plant project is 0.573 tCO2/MWh).

4.2 Project Emissions

Project emissions shall be accounted by using the following equation:

$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$ (2)

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 emissions from the operation of dry, flash steam or binary geothermal power plants in year y (t CO2e/yr)

$PE_{HP,y}$ = Project emission from water reservoirs of hydro power plants in year y (tCO2e/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 solar power plant without fossil fuel consumption, and according to para 36 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 dry, flash steam or binary geothermal power plants ($PE_{GP,y}$)

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

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

Project is a solar power plant hence inapplicable and $PE_{HP,y} = 0$

4.3 Leakage

No Leakage is accounted for in the methodology.

4.4 Net GHG Emission Reductions and Removals

According to the approved methodology ACM0002 ver.19.0, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO_2e)

BE_y = Baseline emissions in year y (t CO_2)

PE_y = Project emissions in year y (t CO_2e)

Table 7: Calculation of emission reductions

	Value/Result	Source/reference
Total installed capacity	18+24 = 42 MWc	Project documents
Net electricity delivered to the grid ($EG_{PJ,y}$)	44,808 + 34,280 = 79,088 MWh/yr	Project documents (nominal average) $[EG_{PJ,y} = EG_{facility,y}]$
Grid emission factor ($EF_{grid,CM,y}$)	0.573 tCO_2e/MWh	ASB0034-2021
Baseline emissions (BE_y)	25,674 + 19,642 = 45,316 tCO_2e	Section 3.1 $BE_y = EG_{PJ,y} \cdot EF_{grid,CM,y}$

Project emissions (PE_y)	0 tCO_2e	Section 3.2
Emission reductions (ER_y)	45,316 tCO_2e	$ER_y = BE_y - PE_y$

.

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)
01-May-2023 / 31-12-2023	23,232	0	0	23,232
2024	47,142	0	0	47,142
2025	46,883	0	0	46,883
2026	46,624	0	0	46,624
2027	46,368	0	0	46,368
2028	46,114	0	0	46,114
2029	45,860	0	0	45,860
01-January 2030 / 30 April -2030	14,994	0	0	14,994
Total	317,217	0	0	317,217

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO2/MWh
Description	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"

Source of data	As per ASB0034-2021
Value applied	0.573
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"
Purpose of Data	Calculation of baseline emissions
Comments	-

5.2 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
Source of data	Measured directly with electricity meter(s) at project site.
Description of measurement methods and procedures to be applied	Electricity outputs will be electronically stored and invoiced monthly to Sonabel, after reconciliation with internal meter which readings are recorded on a record sheet by the Technical/Engineering/ Maintenance Department under the Plant Manager's authority
Frequency of monitoring/recording	Continuous measurement and at least monthly recording
Value applied	79,088
Monitoring equipment	Bi-directional electronic electricity meters measuring the net electrical energy delivered to Sonabel with the following specifications: Make: Itron Model: SL7000 Accuracy class: 0.2S (±0. 2%)
QA/QC procedures to be applied	Cross check of measurement results with invoiced electricity. Calibration of the meters will be carried out after each deviation of more than +- 2% between the 2 meters as per manufacturer &

	PPA specifications. *A calibration of the meters shall be done by a certified third party every three years*
Purpose of data	Calculation of baseline emissions
Calculation method	Electronic recording
Comments	-

5.3 Monitoring Plan

The proposed project activity monitoring plan complies with the methodology ACM0002 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources, whereby it is stated that:

"All data collected as part of monitoring should be archived electronically and be kept at least for 2 years after the end of the last crediting period".

Therefore, the quantity of net electricity generation supplied by the project plant to the grid will be reliably monitored through calibrated electricity meters and cross-checked with sales records as per internal monitoring practices.

Monitoring team and training

Data collection, consolidation and results analysis will be undertaken by a dedicated team adequately trained, well aware of VCS requirements. This team will not have any hierarchical relationships or dependence links with all entities involved to measure net electricity supplied to the grid and to assure the correct operation and maintenance of the measuring equipment. This independence shall guarantee the integrity of the work that will be done.

Quality management procedures

The implementation of a system of supervision and control that will transfer real-time all monitoring information for off-site recording will allow the operator to access and retrieve safely all Project data regardless of eventual incidents.

Meter measurements by Sonabel main/back-up shall not exceed +-2% difference, beyond which dysfunctional meter will in all cases need to be identified by Sonabel and the solar PV owners, adjusted or replaced within 48 hours in accordance with manufacturer guidelines. After each deviation of more than +- 1%, a test and calibration of the meters will be carried out for each meter, certified by a third party.

Non-conformance data during uncalibrated periods will systematically be discounted by the corresponding error margin.