



Ouarzazate II Concentrated Solar Power Project



Document Prepared by Numerco Limited

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PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The Ouarzazate II Concentrated Solar Power Project (hereafter referred as “The Project” or NOORo II) consists installed capacity of 200MW of solar power plant. Ouarzazate II (hereafter referred as NOORo II) uses concentrated solar power (CSP) parabolic trough technology and includes 7 to 8 hours of thermal energy storage.

Technical specification:

- Capacity: 200 MW
- Storage: 7.5 hours of energy storage
- Tower height: 250 meters
- Thermal Storage Capacity: 2,800 MWh
- Technology: SENERtrough-2 parabolic trough collectors
- Solar Collectors: 400 loops, each with four solar collector assembly (SCA) modules
- Cooling system: Dry cooling system to reduce water use

Area: 612 hectares; The start date of commercial operation is dated on 25-April-2018. All project equipment and facilities as described in the registered VCS PD have been correctly installed. Please refer to section 3.1 for details.

Construction and O & M stated in early 2014 for NOORo II project. The start date of commercial operation is dated on 25-April-2018. All project equipment and facilities as described in the registered VCS PD have been correctly installed.

The Project is expected to supply around 699 GWhr per year to the Moroccan electricity grid, which is dominated by fossil fuels, thereby reducing greenhouse gas emissions through the provision of clean energy to the grid. It is expected to result in a reduction of an average of 406,293 tCO₂ per year and 4,062,929 tCO₂ over the crediting period.

This monitoring period covers the period from 01-January-2020 to 31-December-2023. The project operated in accordance with the registered VCS PD. Total GHG emission reduction achieved in this monitoring period is 1,278,703 tCO₂e.

The installed project is the second stage of a 580 MW solar power complex (the first stage, NOORo I is already registered as a CDM under the project number 8946), and represents the first step of the Solar Plan launched in 2009 by the Moroccan Government, which aims at installing at least 2,000 MW of solar generation capacity by 2020. Noting that renewable energy deployment has

been accelerated with the objective to reach 52% of the energy mix by 2030. The Solar Plan promotes the use of solar energy in Morocco, along with the development of local skills in manufacturing, construction and operation of power plants, and it supports education, research and development activities in the solar sector.

1.2 Audit History

Audit type	Period	Program	Validation/verification body name	Number of years
Validation	First Crediting Period 1st, 25-April-2018 – 24-April-2028	VCS Program	Earthood Services Private Limited	10 Years
1 st Verification	25-April-2018 – 31-December-2019	VCS Program	4K Earth Science Private Limited	1.66 years
2 nd Verification	01-January-2020-31-December-2023	VCS Program	KBS Certification Service Limited	4 years
Total	First Crediting Period 1st, 25-April-2018 – 24-April-2028	-	-	Validation : 10 years Verification: 5.66 years

1.3 Sectoral Scope and Project Type

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Sectoral scope ¹	Energy (renewable/non-renewable)
Project activity type	The project is not a grouped project.

1.4 Project Proponent

Provide contact information for the project proponent(s). Copy and paste the table as needed.

Organization name	Numerco Limited
Contact person	Mr Gareth Turner
Title	Director
Address	16 Great Chapel St, Soho, London W1F 8FL, United Kingdom
Telephone	+44 20 8004 3302

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>

Email	gareth.turner@numerco.com
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1.5 Other Entities Involved in the Project

Organization name	Moroccan Agency for Sustainable Energy (Masen)
Role in the Project	Project developer, operator and owner
Contact person	Mr. Tarik Hamane
Title	Head of Development, member of the Executive Board
Address	N° 50 Rocade Sud, Rabat - Casablanca A-B-C Buildings Zenith Rabat Souissi Rabat, Morocco
Telephone	+212 (0)5 37 57 45 50
Email	t.hamane@masen.ma

1.6 Project Start Date

Project start date	25-April-2018
Justification	25-April-2018 is the date of Commercial Operation

1.7 Project Crediting Period

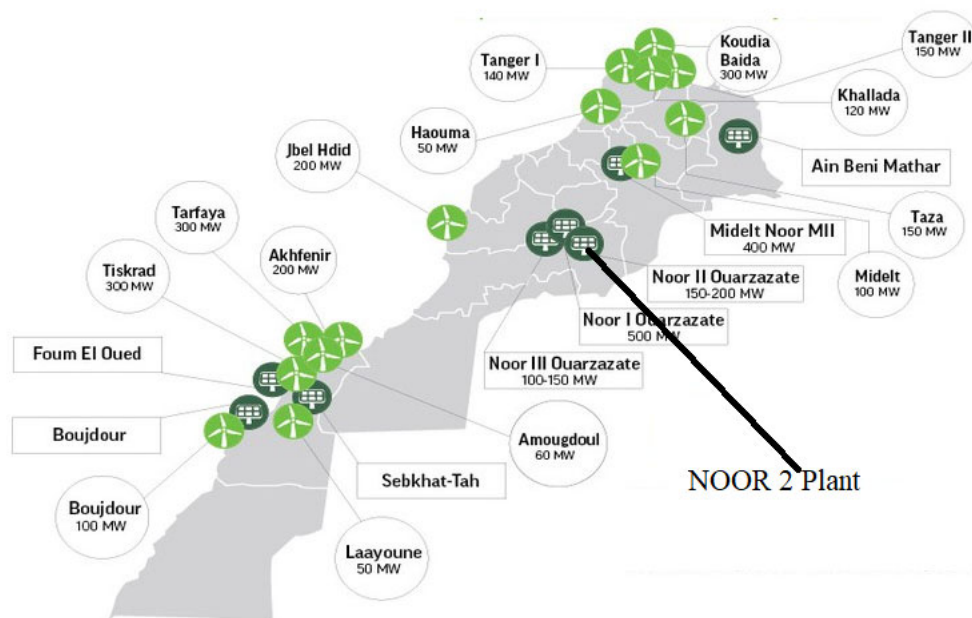
Crediting period	☐ Seven years, twice renewable ☐ Ten years, fixed ☒ Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)
Start and end date of first or fixed crediting period	25-April-2018 to 24-April-2028 Crediting Period: 10 years (renewal maximum 2 times)

1.8 Project Location

The project is located on a greenfield of the Ait Ougrou rural community, and falls within the administration of the Ghassate Commune. Lies between 31° 2'6.31"N Latitude and 6° 52'8.34"W Longitude

The proposed project sits adjacent to the national highway connecting Ouarzazate and Errachidia, and is approximately 10Km north east of the city of Ouarzazate, 4Km north of National Road N10 and about 20Km north of Mansour Ed Dahbi Dam. The specific plot for the NOORo II CSP has a total area of 460 ha and is part of the 3,000 ha NOORo complex.

Figure 1: Location of the project



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	19.0
Tool	Tool07	Tool to calculate the emission factor for an electricity system	07.0

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

If yes, provide required evidence of no double issuance as outlined by the VCS Standard.

1.10.2 Registration in Other GHG Programs

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

☐ Yes ☒ No

If yes, provide the registration number and all relevant details including the date of project inactivity in the other GHG program.²

1.11 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.

² The requirement to provide the date of project inactivity only applies to projects which request registration or crediting period renewal under the VCS Program on or after 1 January 2025.

☐ Yes ☒ No

If yes, provide all required evidence of no double claiming as outlined by the VCS Standard.

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

If yes, provide all required evidence of no double claiming as outlined by the VCS Standard.

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

If yes to all:

Provide evidence of the public statement. Evidence must be provided in this section or in an appendix.

1.12 Sustainable Development Contributions

The project will help to reduce GHG emissions versus the high-growth, coal dominated business-as-usual scenario. The proposed project promotes local sustainable development through the following aspects:

- The project activity will displace the power generation of fossil fuel power plants, reducing CO₂, SO_x and NO_x emissions significantly, thus mitigating the air pollution and its adverse impacts on human health.
- Improvement of the fossil fuel dominated fuel mix of the electricity generation in the power grid by providing clean and renewable energy source, and help to energy supply security.
- Promote application and diffusion of the innovative/creative solar CSP technology in Morocco through the demonstrative practice of the project activity

Table 1: Sustainable Development Contributions

Row number	SDG target	SDG indicator	Net impact on SDG indicator	Current project contributions	Contributions over project lifetime
Sequential row number	SDG Target number	Number and text of SDG indicator or, if no official SDG indicator is applicable, user-defined indicator	Indicate the project's contribution to the SDG Indicator (implemented activities to increase or decrease)	Brief description of the quantifiable impact of the project's activities related to the SDG indicator, during the monitoring period.	Brief description of the cumulative quantifiable impact of the project's activities related to the SDG indicator, over the project lifetime.

1)	7.2	7.2.1 Renewable energy share in the total final energy consumption	Implemented activities to increase	The project produces electricity from renewable energy sources using solar power as the power source and contributes to Morocco's growing electricity demand through a sustainable and low carbon technology. Prevented 2,127,302 MWh net electricity generation from fossil fuels for the monitoring period 01 January 2020 to 31 December 2023 (2nd monitoring period) The project improved the fossil fuel dominated fuel mix of the electricity generation in the power grid by providing clean and renewable energy source and helped to energy supply security	Prevented 5,671,845 MWh net electricity generation from fossil fuels for the period 25-April-2018 to 24- April- 2028 (crediting period)
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2)	8.3	8.3.1 Proportion of Informal employment in non-agriculture employment, by sex	Implemented activities to increase	During construction and operational period, the project has created approx. 9 number of employment opportunities for the local community. The project contributes to the economic development of the region by providing sustainable energy resources. As contributing to SGD 8 Decent Work and Economic Growth, jobs have been created.	As contributing to SDG8, Decent Work and Economic Growth, the project will create the 9 employment opportunities for the local community during the entire project crediting period.
3)	13.2	13.2.2 Total greenhouse gas emissions per year	Implemented activities to increase	By producing electricity from solar energy, the project activity has prevented the release of 1284,867 tCO ₂ into the atmosphere during the period from period 01 January 2020 to 31 December 2023 (2 nd monitoring period)	The project activity has prevented the release of 3,496,012 tCO ₂ into the atmosphere during the entire crediting period from 25 April 2018 to 24 April 2028 .

1.13 Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

The stakeholder structure has not changed since validation. Details of the stakeholder structure are given in section 2.1.2.

Stakeholder Identification

The stakeholders have been identified as individuals who will be directly or indirectly impacted due to the project activity. Direct stakeholders are those who deemed to either have a direct influence on the project or be directly influenced by the project, including but not limit to staff of the solar power project and local residents.

Stakeholder Category	Direct/Indirect Affected	Relevance to the Project Activity
The staff of the solar power project	Direct	The project provided jobs for them.
Local residents around the project site	Direct	The project can provide them with new jobs and renewable energy.
Local government including development	Direct	Approval for construction and operation of the project.

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Several Community Consultation meetings have been held throughout the project scoping, planning and design phases of the NOORo Complex. A further community consultation meeting was undertaken in 3rd February 2015 to inform the stakeholders of the details of NOORo II & III and incorporate their concerns in the assessment undertaken in the SESIAs (Specific Environmental and Social Impact Assessment). Measures to compensate and/or mitigate the negative impacts that the community voiced in the consultation meeting have been incorporated in the design, operation and management of the proposed facility.

In Morocco, the public consultation process (“enquête publique”) is well defined under the national law 12-03 and is a pre-requisite to carrying out the EIA (Environmental Impact Assessment).

With regards to community consultation and stakeholder engagement, the Moroccan legislation had already been respected and fulfilled, since several rounds of public consultations were conducted during the preparation of the FESIA (Framework Environmental and Social Impact Assessment) for the NOORo complex. However, in order to ensure that international requirements are respected, a specific round of consultation has been undertaken for NOORo II & III.

The local stakeholders are identified as the people living in the villages in vicinity of the solar project. The comments were received by the survey through following questionnaire during 060-July-2019 to 30-September-2019. The actual survey was conducted in local language i.e. Arabic.

Legal or customary tenure/access rights	There is no uncertainty or change in land tenure arrangements, resource access rights, community-based property rights and customary rights, access rights or land ownership.
Stakeholder diversity and changes over time	Stakeholder diversity: The staff of the project, the local residents around the project site, and the local government are affected by the project activity directly. Part of employees are mainly from the project area, and they have different levels of education and skills, and income levels may vary. The farmers around the project live in different villages, and they may have different social networks and ways of interacting. Workers in government departments may come from different backgrounds and have different expertise and experience. Government authorities are responsible for regulating and approving the operation of the project, and different government authorities may have different policies and regulations. Over time, the members of each group will adjust, but their groups doesnot change much in terms of society, economy, culture, etc.
Expected changes in well-being	The implementation of the project is expected to have a positive impact on the well-being and other characteristics of stakeholders. Relative to the baseline scenario of electricity delivered to Grid by the project that would otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid, the project bring about the following changes: Local people's well-being: The construction and operation of the project provide employment opportunities for the local people, 9 persons have been employed by the project as long-term employee period. Social welfare: The implementation of the project promoted the local economic development, and provided employment opportunities. Climate change Impact: The Project generates electricity

	from renewable source to displace equal electricity generated from fossil fuel fired power plants. Collectively, these changes will have a positive impact on villagers' livelihoods and living environment around the project site.
Location of stakeholders	The proposed project sits adjacent to the national highway connecting Ouarzazate and Errachidia, and is approximately 10Km north east of the city of Ouarzazate, 4Km north of National Road N10 and about 20Km north of Mansour Ed Dahbi Dam. The specific plot for the NOORo II CSP has a total area of 460 ha and is part of the 3,000 ha NOORo complex lot
Location of resources	The location of territories and resources which stakeholders own or to which they have customary access are located greenfield of the Ait Ougrour rural community, and falls within the administration of the Ghassate Commune. Lies between 31° 2'6.31"N Latitude and 6° 52'8.34"W Longitude

2.1.2 Stakeholder Consultation and Ongoing Communication

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Ongoing consultation	For continuous communication with local stakeholders, the project owner public its office telephone to local people and put a grievance notebook in the office of the company. Anyone who have comments on the project could write on the book or communicate through phone.
Date(s) of stakeholder consultation	03- February - 2015
Communication of monitored results	No negative comments were received, overall finding was that the participants expected that the local villagers would benefit from the project activity. The general queries raised during the stakeholder consultation meetings were settled by having Question and Answers session with each survey participant individually.

Consultation records	Project developer has effective grievance mechanism. Stakeholders can any time visit the site/contact the site in-charge and provide their grievances. The site in-charge is responsible for addressing the grievances received from stakeholders. During the present monitoring period there is no grievances received from any stakeholders.
Stakeholder input	Generally, the stakeholders were pleased with the project. Since they have informed regarding the project during stakeholder consultation process, they have no negative comments on the project.

2.1.3 Free, Prior, and Informed Consent

Consent	Relevant permits were obtained during the validation period.
Outcome of FPIC	The project activity did not damage land, did not relocate people without their consent, and did not forcibly physically or economically displace people.

2.1.4 Grievance Redress Procedure

Grievances received	Resolution and outcome
No negative inputs have been received during this monitoring period.	The grievance mechanism is in place. Project Owner maintains a grievance register in plant office for local stakeholders to give feedback/grievances. In case of grievances, the nature of probable resolution is discussed with the plant head office and implemented by the site in charge.
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2.1.5 Public Comments

Summary of comments received	Actions taken
There hasn't been any public consultation during this monitoring period	N/A
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2.2 Risks to Stakeholders and the Environment

2.2.1 Management Experience

The PP's management team has the experience and expertise to effectively implement similar project activities. The team members have many years of working experience in the field of solar power plant with relevant skills and expertise in project planning, implementation and supervision to effectively manage and drive the implementation of the project.

. The project has male and female employees of different genders, and there are female employees in management positions. There is no significant gender difference between female employees and male employees in terms of salary, promotion opportunities and welfare benefits, and employees of different genders have equal opportunities to obtain training and development resources. In regular employee satisfaction surveys, all employees feel that the project is treated equally in terms of gender and pay. The project adopts a compliant recruitment and employment policy to ensure that the recruitment and employment policies comply with relevant ILO standards and do not involve any form of human trafficking, forced Labour and child Labour. PP conducted comprehensive background checks and comply with local labor laws and regulations to ensure that employees are not exploited and abused.

The project has put in place monitoring mechanisms to ensure that all employees and partners involved in the project are not involved in human trafficking, forced Labour and child Labour. PP conducts regular on-site inspections and audits to ensure that there are no violations of labor rights during the implementation of the project. The PPs work with partners who share the same commitment to labor rights to ensure that the entire supply chain is free from human trafficking, forced labor and child labor.

The project provides training to employees and partners on human trafficking, forced Labour and child Labour to increase their awareness of these issues and how to avoid and report possible violations

2.2.2 Risk assessment

Risk identified	Mitigation or preventative measure(s) taken
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Natural and human-induced risks to stakeholders' wellbeing	No risk identified	-
Risks to stakeholder participation	No risk identified	Stakeholders are involved in every stage of informing about the project activity. The complaint mechanism is fully functioning.
Working conditions	No risk identified	All necessary training regarding the health and safety of employees is provided. Child labor as defined in the ILO Minimum Age Convention is not permitted. The Project Developer ensures that there is no forced labor, and that all employment complies with national occupational and occupational health and safety laws, obligations under international law, and the principles and standards and essential conventions of the International Labor Organization (ILO).
Safety of women and girls	No risk identified	The project does not endanger the safety of girls and women.
Safety of minority and marginalized groups, including children	No risk identified	The project does not jeopardize the safety of minorities and isolated groups, including children.
Pollutants (air, noise, discharges to water, generation of waste, and release of hazardous materials and chemical pesticides and fertilizers)	No risk identified	The project is a solar energy project. The Environmental Impact Assessment was carried out the summary of the findings of the report are the following. No negative impact was assessed.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

	Risks identified ³	Mitigation or preventative measure(s) taken
Discrimination	The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.	All requirements, mentioned in the Environment Impact Report have been followed on regular basis.
Sexual harassment	The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.	All requirements, mentioned in the Environment Impact Report have been followed on regular basis.
Gender equity in labor and work	The project does not reduce access to or control of resources for women. The project does not involve in any form discrimination in any kind of form. The project respects the employees' freedom of association and their right to collective bargaining and is not complicit in restrictions of these freedoms and rights.	All requirements, mentioned in the Environment Impact Report have been followed on regular basis.
Forced labor	The Project Developer ensures that there is no forced labour, and that all employment is in compliance with national labour and occupational health and safety laws, with obligations under international law, and consistency with the principles and standards embodied in the International Labour Organization (ILO) fundamental conventions.	All requirements, mentioned in the Environment Impact Report have been followed on regular basis.

³ 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.

Child labor	Child labour, as defined by the ILO Minimum Age Convention, is not allowed	All requirements, mentioned in the Environment Impact Report have been followed on regular basis.
Human trafficking	No Human Trafficking involved with the project activity.	All requirements, mentioned in the Environment Impact Report have been followed on regular basis.

2.3.2 Human Rights

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Risks identified	Mitigation or preventative measure(s) taken
The project owner respects internationally proclaimed human rights including dignity, cultural property and uniqueness of indigenous people. The project is not complicit in Human Rights abuses.	All requirements, mentioned in the Environment Impact Report have been followed on regular basis.

2.3.3 Indigenous Peoples and Cultural Heritage

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Risks identified	Mitigation(s) or preventative measure taken
There is no resettlement issue associated with the Project. There was no house in the project area, thus the project did not cause any resettlement	N/A

2.3.4 Property Rights

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Risks identified	Mitigation or preventative measure(s) taken
N/A	N/A

2.3.5 Benefit Sharing

There is no benefit sharing in the project activity.

Summary of the benefit sharing plan	N/A
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	The project is a solar energy project. None of the species found on or near the site is rare or endangered. Nevertheless, care should be taken to keep any impact as low as reasonably possible, both on the site itself and on any surrounding area affected by the project (e.g. site access roads), as a precautionary measure.
Soil degradation and soil erosion	No risk identified	The project is a solar energy project so soil degradation and soil erosion not occur.

Water consumption and stress	No risk identified	The project is a solar energy project. Sanitary wastes and waste from maintenance and food production will occur only in small quantities. Site management practices introduced during construction is continued (e.g. storage and disposal of wastes; training and supervision of staff and contractors).
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2.4.1 Rare, Threatened, and Endangered species

Species or habitat	There are not any endangered species identified as potentially present within the Project boundary (including those that may route through the area). The Project does not potentially impact other areas where endangered species may be present through transboundary affects.
Areas needed for habitat connectivity	N/A
...	...

	Risks identified	Mitigation or preventative measure(s) taken
Habitats for rare, threatened, and endangered species	N/A	N/A
Areas for habitat connectivity	N/A	N/A

2.4.2 Introduction of species

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

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Existing invasive species	Mitigation measures to prevent the spread or continued existence of invasive species
N/A	N/A

	Risks identified	Mitigation or preventative measure(s) taken
Invasive species	N/A	N/A

2.4.3 Ecosystem conversion

	Risks identified	Mitigation or preventative measure(s) taken
Ecosystem conversion	N/A	N/A

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The solar plant is in continuous operation as per the technical design. No events that may impact the GHG emission reductions and monitoring have been registered.

There is no leakage from the project and no changes to the project proponent have been registered

3.2 Deviations

3.2.1 Methodology Deviations

No deviations from the methodology for the estimation of the emission reductions have been applied during this monitoring period.

3.2.2 Project Description Deviations

As planned during the conceptualization of the project NOOR II, the monitoring plan of the project was as mentioned in the registered Project Design (PD). Due to some change in the implementation plan and power purchase agreements of the project, monitoring plan has to be revised in the process of monitoring of the project. Due to this, we had to change the monitoring to the present systems as mentioned in the current Monitoring Report (MR) submitted to VVB for verification. This is the post registration deviation and permanent till the project lifetime.

Flow meters are not installed in the monitoring system as mentioned in PD. Other parameters such as $FC_{I,NOOR\ II,y}$, $NCV_{I,y}$ and $EF_{CO2,I,y}$ are not monitored in the present and future verification periods.

No deviations from the project design have been applied during this monitoring period.

3.3 Grouped Projects

Not applicable.

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	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Operating margin CO ₂ Emission Factor of national electricity grid in year y
Source of data	National power utility (ONEE), IPCC
Value applied	0.634
Justification of choice of data or description of measurement methods and procedures applied	Official statistics released by the national power utility (ONEE), reliable data source, latest data available (2016, 2017 & 2018) 2006 IPCC Guidelines on National GHG Inventories default values

	The operating margin is calculated as per the “Tool to calculate the emission factor for an electricity system” , version 7.0
Purpose of data	Calculating combined margin emission factor ($EF_{grid,CM,y}$) of national grid
Comments	This parameter is fixed ex-ante for the entire crediting period

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ / MWh
Description	Build margin CO2 Emission factor of national electricity grid in year y
Source of data	National power utility (ONEE), IPCC
Value applied	0.515
Justification of choice of data or description of measurement methods and procedures applied	Official statistics released by the national power utility (ONEE), reliable data source, latest data available (2018) 2006 IPCC Guidelines on National GHG Inventories default values; The build margin is calculated as per the “Tool to calculate the emission factor for an electricity system” , version 7.0
Purpose of Data	Calculation of baseline emissions
Comments	This parameter is fixed ex-ante for the entire crediting period

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO ₂ / MWh
Description	Combined margin CO2 Emission factor of national grid applying for solarpower plant in year y
Source of data	National power utility (ONEE), IPCC
Value applied	0.604
Justification of choice of data or description of measurement methods and procedures applied	Calculate using $EG_{grid,OM,y}$ and $EF_{grid,BM,y}$ published by Department of Climate Change and Wom , WBM with value of 0.75 and 0.25 for solarpower plant project
Purpose of Data	Calculating baseline emission
Comments	This parameter is fixed ex-ante for the entire crediting period

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{NOORo II,y}$											
Data unit	MWh											
Description	Quantity of net electricity generation supplied by NOORo II to the grid in year y											
Source of data	Measurement by Bi Directional electronic meters											
Description of measurement methods and procedures to be applied	Bi-directional electricity meters, which will measure the quantity of electricity supplied by the project plant to the grid and the quantity of electricity delivered to the project plant from the grid.											
Frequency of monitoring/recording	Monthly, continues measurements											
Value monitored	<table><tr><td>2020 Vintage (01-January-2020-31-December-2020)</td><td>504,148</td></tr><tr><td>2021 Vintage (01-January2021-31-Decemebr-2021)</td><td>633,867</td></tr><tr><td>2022 Vintage (01-January-2022-31-December-2022)</td><td>419,173</td></tr><tr><td>2023 Vintage (01-January-2023-31-December-2023)</td><td>559,903</td></tr><tr><td>Total</td><td>2,117,091</td></tr></table>		2020 Vintage (01-January-2020-31-December-2020)	504,148	2021 Vintage (01-January2021-31-Decemebr-2021)	633,867	2022 Vintage (01-January-2022-31-December-2022)	419,173	2023 Vintage (01-January-2023-31-December-2023)	559,903	Total	2,117,091
2020 Vintage (01-January-2020-31-December-2020)	504,148											
2021 Vintage (01-January2021-31-Decemebr-2021)	633,867											
2022 Vintage (01-January-2022-31-December-2022)	419,173											
2023 Vintage (01-January-2023-31-December-2023)	559,903											
Total	2,117,091											
Monitoring equipment	Bi-directional electronic electricity meters measuring the net electrical energy Post and delivery point – ECSO Main Energy meter Number– (02833838, Elster make, 0.2s Accuracy class) Emergency Energy meter Number – (02833839, Elster make, 0.2s Accuracy class)											
QA/QC procedures to be applied	Measurements from the main meters are cross checked with receipts and cross check meter readings. The accuracy of the meters is 0.2s. In case of failure of the main meter used for reporting and transaction purposes, back-up and cross check meters can be used.											

The electricity meter meets the standards specified by the International Electrotechnical Commission (IEC). The onsite calibration interval is hundred and eighty 180 days. ONEE the grid operator conducts the calibrations and is a qualified entity.

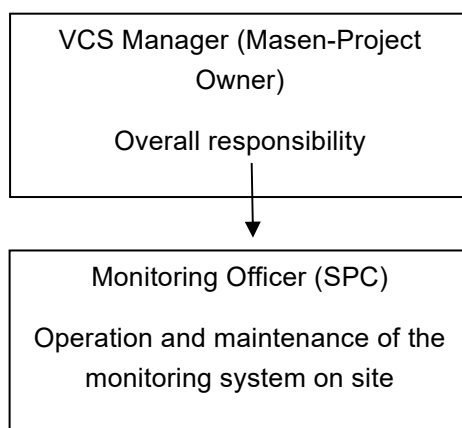
Meter	Calibration date	Validity
Main meter – 02833838	15 th October 2020	The validity is not mentioned in the certificate, according to the grid operator (ONEE) the validity of the calibration is more than 1 years up to 2 years
Emergency meter – 02833839	15 th October 2020	
Main meter – 02833838	19 th April 2021	
Emergency meter – 02833839	19 th April 2021	
Main meter – 02833838	28 th October 2021	
Emergency meter – 02833839	28 th October 2021	
Main meter – 02833838	21 st April 2022	
Emergency meter – 02833839	21 st April 2022	
Main meter – 02833838	31 st October 2022	
Emergency meter – 02833839	31 st October 2022	
Main meter – 02833838	2 nd May 2023	
Emergency meter – 02833839	2 nd May 2023	

	Main meter – 02833838 Emergency meter – 02833839	2 nd November 2023 2 nd November 2023		
Purpose of the data	Baseline Emission			
Calculation method	Electronic recording			
Comments	-			

4.3 Monitoring Plan

1.) Operation and management structure

Overall responsibility for daily monitoring and reporting lies with the project owner. A monitoring group will be established within the project company to carry out the monitoring work. The structure of the monitoring group is as follows:



The responsibilities of each role in the team structure are:

- VCS manager has the overall management responsibility, especially supervising the implementation of the monitoring plan.
- Monitoring officer measures the electricity imported to and exported from the project and performs internal verification of the measurement, collects relevant receipts and calculates emission reductions. Finally, the monitoring reports will be reviewed by General Manager. Finally, the monitoring reports will be reviewed by the General Manager.

2.) Monitoring equipment and installation

Electricity meter(s) measure the quantity of net electricity generation supplied by the power plant to the grid.

The electricity meters' accuracy is within 0.2%. The maintenance and calibration regime will follow the relevant standards and/or the manufacturer's specifications.

The electricity meter corresponds to the one used for transaction purposes. In case of meter(s) failure, check meter(s) can be used to estimate the quantity of net electricity generation supplied by the power plant to the grid.

3.) Data collection system

All data collected on-site by the SPC can be verified by Masen through a ONEE station connected to the plant. Masen will be responsible for the following:

- perform a check of all the relevant data received from the SPC,
- perform the ER calculations, and
- analyse emission reduction performance periodically.

4.) Quality assurance and quality control (QA/QC)

QA/QC practice involves:

- The metering equipment will be calibrated each 6 months and checked for maintenance annually for accuracy;
- Calibration will be carried out by qualified parties with the records being supplied to the project owner, and the calibration shall ensure sufficient accuracy so that any error resulting from such equipment shall not exceed the allowable error of full-scale rating.

During the monitoring period calibration is not conducted as per the approved monitoring plan and delay has occurred for different periods for the main and check meters. As per the results mentioned in the latest calibration certificates the error was found within the maximum permissible limits (+/-0.2%) during the calibration of energy meters. As per VVS PA v 03 para 366 (a) requirement: error factor of "-0.2%" should be applicable for export & +0.2% to the import i.e. the measured values. However, monthly generation reports provide only net electricity generation, the separate export and import values are not available. Hence being conservative and to account for the error for both export & import, a cumulative error of maximum "-0.48%" on net electricity generation has been applied for the entire monitoring period.

All data collected as part of monitoring is archived electronically. All information should be stored by Masen and all the material has a physical copy for backup. In

order to facilitate auditors' reference of relevant literature relating to the project, the project material and monitoring results are indexed. And all data including calibration records is kept until 2 years after the end of the crediting period, or the last issuance of VCUs, whichever is later.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to ACM0002 and the registered VCS PD of the Project, the baseline emission BE_y during the monitoring period results from:

Equation1:

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

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)
$EF_{grid,CM,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the “Tool to calculate the emission factor for an electricity system” version 7.0.0 (tCO ₂ /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,

i.e. it is a greenfield power plant, $EG_{PJ,y}$ is calculated as follows:

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

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

The monthly electricity data and baseline emission are listed in the table 2:

Table 2: Calculation of the baseline emission

Monitoring period	EGfacility,y(MWh)	$EF_{grid,CM,y}$ (tCO _{2e} /MWh)	BE _y (tCO _{2e})
2020	504,148	0.604	304,501
2021	633,867	0.604	382,850
2022	419,173	0.604	253,177
2023	559,903	0.604	338,175
Total	2,117,091	0.604	1,278,703

5.2 Project Emissions

The project emissions from this activity are zero. $PE_y = 0$

5.3 Leakage Emissions

There are no leakage emissions from this project activity.

5.4 GHG Emission Reductions and Carbon Dioxide Removals

The emission reductions generated by the project are calculated as follows:

Equation 2:

$$ER_y = (BE_y - PE_y - LE_y)$$

Where:

BE_y - Baseline Emissions in year y (tCO_{2e}/y)

PE_y - Project Emissions in year y (tCO_{2e}/y)

LE_y - Leakage Emissions in year y (tCO_{2e}/y)

For projects that are not required to assess permanence risk, complete the table below for the project crediting period:

Vintage period	Baseline emissions (tCO _{2e})	Project emissions (tCO _{2e})	Leakage emissions (tCO _{2e})	Reduction VCU's (tCO _{2e})	Removal VCU's (tCO _{2e})	Total VCUs (tCO _{2e})
2020 Vintage (01-January-2020-31-December-2020)	304,501	0	0	304,501	2020 Vintage (01-January-2020-31-December-2020)	304,501
2021 Vintage (01-January-2021-31-December-2021)	382,850	0	0	382,850	2021 Vintage (01-January-2021-31-December-2021)	382,850
2022 Vintage (01-January-2022-31-December-2022)	253,177	0	0	253,177	2022 Vintage (01-January-2022-31-December-2022)	253,177
2023 Vintage (01-January-2023-31-December-2023)	338,175	0	0	338,175	2023 Vintage (01-January-2023-31-December-2023)	338,175
Total	1,278,703	0	0	1,278,703	Total	1,278,703

For projects required to assess permanence risk:

i) Provide the requested information using the table below:

State the non-permanence risk rating (%)

Has the non-permanence risk report been attached as either an appendix or a separate document?	☐ Yes ☒ No
For ARR and IFM projects with harvesting, state, in tCO ₂ e, the Long-term Average (LTA).	
Has the LTA been updated based on monitored data, if applicable?	☐ Yes ☒ No If no, provide justification.
State, in tCO ₂ e, the expected total GHG benefit to date.	
If a loss occurred (including a loss event or reversal), state the amount of tCO ₂ e lost:	-

For all projects, state the estimated ex-ante GHG emission reductions and carbon dioxide removals and the achieved reductions and removals for the monitoring period. Report the percentage difference and explain any difference. The quantities of reductions and removals are the total quantities before any deductions for buffer credits.

Vintage period	Ex-ante estimated reductions/removals	Achieved reductions/removals	Percent difference	Explanation for the difference
2020 Vintage(01-January-2020-31-December-2020)	406,293	304,501	25%	The actual emission reduction for this monitoring period is lesser than the estimated emission reduction for this monitoring period due to low generation.
2021 Vintage (01-January-2021-31-December-2021)	406,293	382,850	6%	The actual emission reduction for this monitoring period is lesser than the estimated emission reduction for this monitoring period due to low generation.
2022 Vintage (01-January-2022-31-December-2022)	406,293	253,177	38%	The actual emission reduction for this monitoring period is lesser than the estimated emission reduction for this monitoring

				period due to low generation.
2023 Vintage (01-January- 2023-31- December- 2023)	406,293	338, 175	17%	The actual emission reduction for this monitoring period is lesser than the estimated emission reduction for this monitoring period due to low generation.
Total	1625172	1,278,703	21%	The actual emission reduction for this monitoring period is lesser than the estimated emission reduction for this monitoring period due to low generation.

APPENDIX 1: COMMERCIALY SENSITIVE INFORMATION

N/A

APPENDIX X: <TITLE OF APPENDIX>

N/A.