Joint Crediting Mechanism Project Design Document Form

A. Project description

A.1. Title of the JCM project

10MW Solar Power Project in Darkhan City

A.2. General description of project and applied technologies and/or measures

The Project involves installation of a large-scale solar power plant with the generating capacity of 10MW in Darkhan City, Mongolia. The project is implemented by Solar Power International LLC, a Mongolian company utilizing the crystalline silicon photovoltaic (PV) modules of Sharp Corporation of Japan (ND-AF310). Sharp's PV modules are well known for high durability, adhering to the company standard which is more stringent than Japan Industrial Standard or International Electrotechnical Commission standards.

The electricity produced by the Project is supplied to the Central Energy System of Mongolia displacing electricity generation by fossil-fuel based power plants, contributing to greenhouse gas emissions reduction in Mongolia.

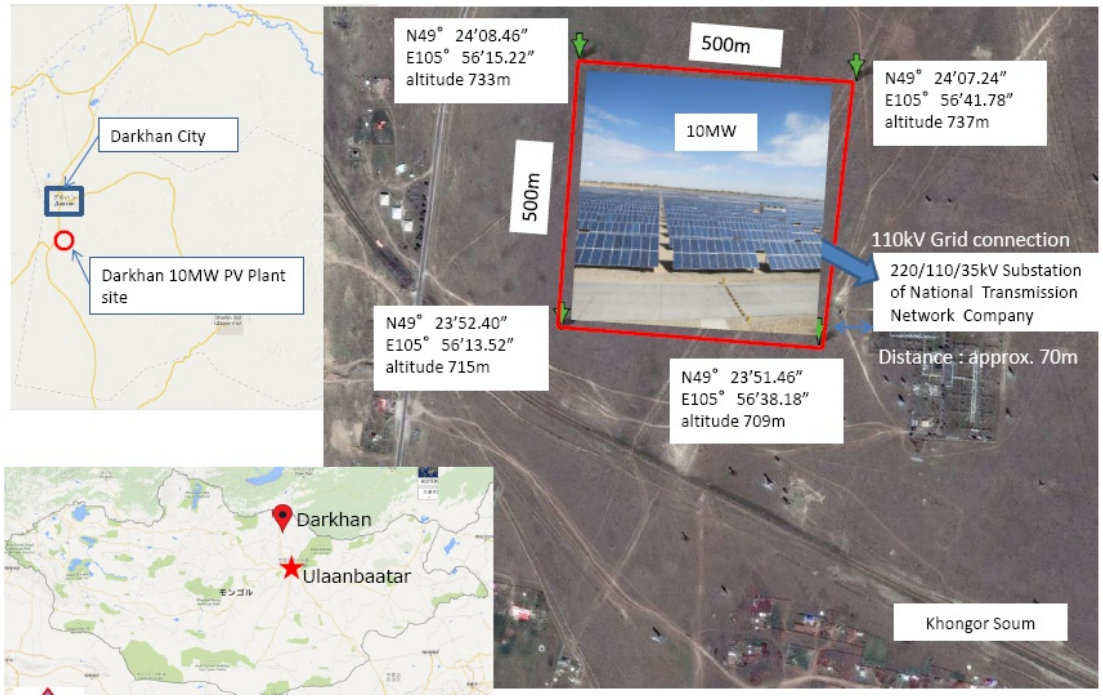


Figure 1: Location and outline of the Project

A.3. Location of project, including coordinates

Country	Mongolia

Region/State/Province etc.:	Darkhan-Uul Province
City/Town/Community etc:	Darkhan City
Latitude, longitude	N49° 24'07.24" E105°56'41.78"

A.4. Name of project participants

Mongolia	Solar Power International LLC
Japan	Sharp Corporation

A.5. Duration

Starting date of project operation	01/01/2017
Expected operational lifetime of project	17 years

A.6. Contribution from Japan

The proposed project was partially supported by the Ministry of the Environment, Japan (MOEJ) through the Financing Programme for JCM Model projects, which provided financial support of less than half of the initial investment for the projects in order to acquire JCM credits. Further, implementation of the proposed project promotes technology transfer of low carbon technologies in Mongolia. Through the financing programme by MOEJ, the green-field state-of-the-art large scale solar power plant has been installed. Operation of the solar power plant is monitored during the project operation. Throughout various stages of project implementation including project design, construction, scheduling, installation, Sharp Corporation has provided local operators with required training and know-how transfer and is also expected to do so continuously for operation and maintenance phases.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	MN_AM003
Version number	Ver02.0

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	The project newly installs solar PV system(s).	The project installs 10MW green-field solar power plant in Darkhan City.

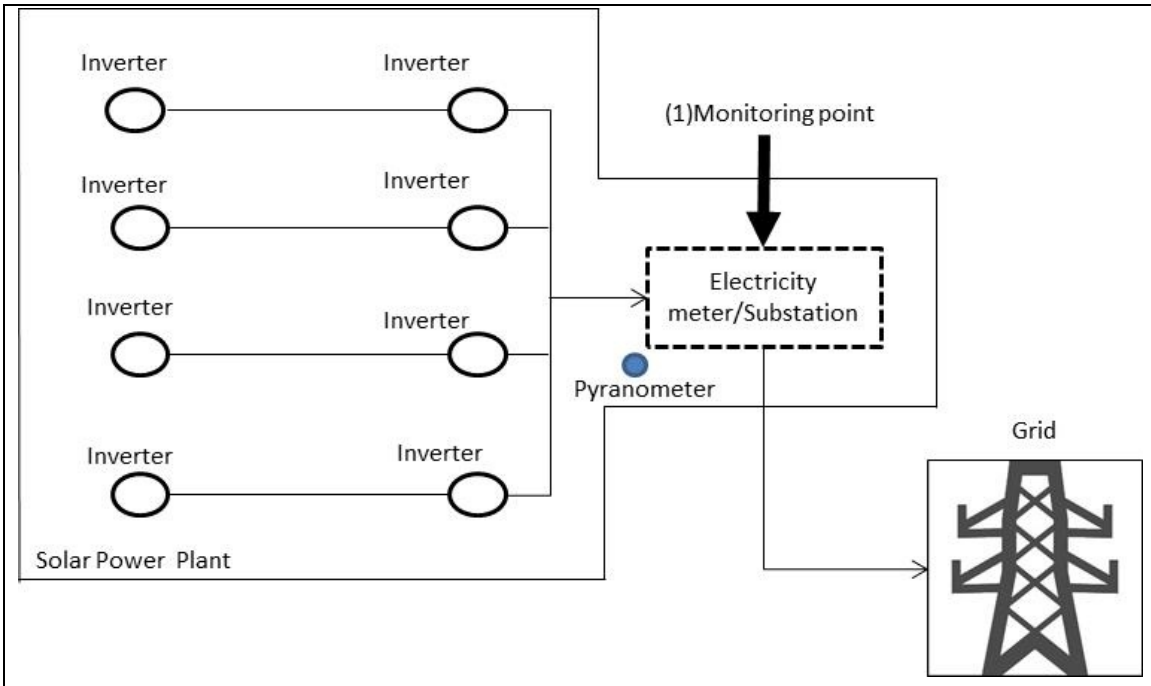
Criterion 2	The PV modules obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).	The PV modules installed in the project have been certified for IEC 61215, IEC 61730-1 and IEC 61730-2).
Criterion 3	The equipment used to monitor output power of the solar PV system(s) and irradiance is installed at the project site.	Electricity meter and pyranometer have been installed at the project site to monitor output power and irradiance respectively.

C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
Consumption of grid electricity	CO_2
Project emissions	
Emission sources	GHG type
Generation of electricity from the solar PV system(s)	N/A

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



Note: "Inverter" refers to the location of inverter houses. The actual number of inverters installed in the project is 16.

Figure 2: Monitoring point

C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2017	11,221.0	0.0	11,221
2018	11,221.0	0.0	11,221
2019	11,221.0	0.0	11,221
2020	11,221.0	0.0	11,221
2021	11,221.0	0.0	11,221
2022	11,221.0	0.0	11,221
2023	11,221.0	0.0	11,221
2024	11,221.0	0.0	11,221
2025	11,221.0	0.0	11,221
2026	11,221.0	0.0	11,221
2027	11,221.0	0.0	11,221
2028	11,221.0	0.0	11,221
2029	11,221.0	0.0	11,221
2030	11,221.0	0.0	11,221

Total (tCO_{2e})	157,094.0	0.0	157,094

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	Yes, under the Law on Environmental Impact Assessment of Mongolia, the Project is required to undergo environmental impact assessment, which was carried out in 2015.

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The major stakeholders of the proposed JCM project have been identified by the project participants as representatives from central and local government departments as well as utility company. Invitation letters were sent to the stakeholders to attend the stakeholder meeting. The stakeholder meeting was held as follows to explain about the Project and solicit their comments.

[Meeting outline]

- Date and Time: 12 December 2016, 10:00-13:00
- Venue: Ulaanbaatr Hotel, Sukhbaatar Square 14, Ulaanbaatar 14192, Mongolia
- Attendees (Total 27 representing the following organizations):
  -Darkhan Provincial Government
  -Khongor District Governer's office
  -Ministry of Energy of Mongolia
  -Energy Regulatory Commission of Mongolia
  -National Dispatch Center
  -National Transmission Network Company
  -Ministry of Environment and Tourism (JCM Secretariat)
  -National University of Mongolia
  -Energy Economics Institute
  -MNFB-VTC Co Ltd
  -Private companies (energy and construction)

[Meeting agenda]

Opening address	H.E. Mr. T. Gantulga Vice Minister, Ministry of Energy
Opening remarks	Mr. Tatsuya Sato, Deputy General Manager, Energy Solutions Business Unit, Sharp Corporation
Introduction of the JCM Scheme	Ms. Kikuko Shinchi, Senior Consultant, Mitsubishi UFJ Morgan Stanley Securities (MUMSS)
Introduction of the JCM project	Mr. Mandalbayar Baldan, General Director, Solar Power International LLC (SPI)
Q and A session	
Closing remark	Mr. Enebish Namjil, Director, Solar Power International LLC (SPI)

[Conclusion]
In general, the project was received positively, and many stakeholders showed their appreciation of the JCM scheme and commended the project participants for bringing the Mongolia's first mega-solar project to completion. The received comments from the local stakeholders, along with the responses/action to the comments, are listed in the following section.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
Department of the National Dispatch Center	Please explain what electricity generation means for night time as mentioned in SPI's presentation.	There is no generation during the night time by Solar power plant.
National University of Mongolia, School of Engineering and Applied	(1) Is the power purchase agreement (PPA) already signed by Energy Regulatory	(1) PPA is not signed by ERC (PPA is signed with National Transmission Network

Sciences	Commission? (2) What is the payback period?	Company and National Dispatching Centre). (2) The payback period is 12 years.
Khongor District	Can you please explain why the CO_2 emission factor mentioned in MUMSS' s presentation and SPI's presentation are different?	MUMSS uses the CO_2 emission factor of the applied methodology approved by the Joint Committee while SPI uses Mongolian government's official CO_2 grid emission factor.
National University of Mongolia	(1) Is it correct to understand that the grid CO_2 emission factor of the JCM methodology is much lower compared to the official value? (2) Please explain how degradation rate of PV modules, 0.7 was determined. Was it based on Mongolian experience taking into consideration local climate conditions or was it based on Japanese data?	(1)Yes, it is correct. The reason is that in the JCM, a methodology takes into account technology improvement on a conservative basis to determine reference emissions. (2) The degradation rate of 0.7 is the value provided by the manufacturer guarantees. Based on experience, humidity has the greatest negative impact on module degradation. Therefore, it is believed module degradation will not be a big issue in Mongolia.
Ministry of Energy of Mongolia	(1) What is the project operation duration? (2) Will the electricity tariff be re-negotiated after payback?	(1) The duration of the project based on the power purchase agreement (PPA) is 25 years. The duration required to transfer JCM credits to the Japanese government is 17 years. In general, the PV modules can be used for as long as 40 years. (2) According to PPA, the same

		tariff will be applied even after the payback. However, it is possible that the tariff will be re-negotiated after the expiration of the PPA.
Darkhan 220/110kV Substation	The road condition between the project site and substation is not good. It would be appreciated if project participants can improve the road.	The project owners will repair and improve the road condition leading up to substation.
National University of Mongolia	Do the project participants have a plan to install batteries to store electricity and use it for the peak time at night?	Currently, the cost of a battery is too high to gain economic merit. If the Mongolian government introduces a policy to increase the electricity tariff of night time, making batteries economical, we might consider it.
Energy Economics Institute	It is appreciated that the project participants developed Mongolia's first mega-solar project. We would like to cooperate future research and studies.	(No further action required)
Tenuun Gerel Construction company	Can PV be installed in home roof-tops in JCM projects? I believe such project will help combat smog issue in the city.	Yes, it is one of the eligible technologies for the JCM , but so far, the only roof-top PV cases are those involving factories, shopping malls, etc.

F. References
Evaluation result of environmental impact detailed assessment report issued by Ministry of Environment, Green Development and Tourism of Mongolia

Reference lists to support descriptions in the PDD, if any.

Annex
n/a

Revision history of PDD		
Version	Date	Contents revised
01.0	08/02/2017	First edition
02.0	28/02/2017	Second edition Updated based on validation protocol
03.0	13/03/2017	Third edition Updated based on further comments