JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Introduction of Smart Mini Grid System at Addu City

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

The proposed JCM project aims to reduce CO_2 emissions by introducing a smart grid system composed of an Energy Management System (EMS), a Battery Energy Storage System (BESS, 0.47MWh) and Solar PV Systems (1.6MW in total). The power generated by the solar PV systems replaces the grid electricity generated by diesel generators (DGs). EMS and BESS enable both the maximum use of variable renewable energy in mini-grid and the efficient operation of the DGs. All the system was completed by the support of Asian Development Bank. Solar PV system was completed in Nov 2018 and EMS and BESS was completed in Dec 2021.

A.3. Location of project, including coordinates

Country	The Republic of Maldives
Region/State/Province etc.:	N/A
City/Town/Community etc:	Addu City
Latitude, longitude	S 0°37'45" E 73°05'58

A.4. Name of project participants

The Republic of Maldives	Fenaka Corporation Limited Ministry of Environment, Climate Change and Technology
Japan	N/A

A.5. Duration

Starting date of project operation	02/12/2021
Expected operational lifetime of project	15 years

A.6. Contribution from Japan

The introduction of the BESS and EMS of the proposed Project was fully financed by a grant from the Japan Fund for the Joint Crediting Mechanism (JFJCM) of the Asian Development Bank, which is a trust fund contributed by the Government of Japan to support the adoption of advanced low-carbon technologies. The state-of-the-art BESS and EMS system, which has been developed by Toshiba Energy

Systems & Solutions Cooperation (Toshiba), is introduced in the proposed project. Toshiba has also provided training to the Maldivian project participants, which will enable the sustainable operation of the project.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	MV_AM002
Version number	Ver1.0

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	EMS, BESS and solar PV system(s) are newly installed to replace a grid and/or captive electricity which is sourced at least from, but not limited to multiple fossil fuel thermal power units such as DGs.	EMS, BESS and solar PV systems are newly installed to replace a grid electricity which is sourced from multiple DGs.
Criterion 2	Installed EMS is equipped with economic load dispatching control function and load frequency control which controls diesel generators and BESS based on projections of electric-load/demand and output of solar PV system(s).	Installed EMS is equipped with economic load dispatching control function and load frequency control which controls diesel generators and BESS based on projections of electric-load/demand and output of solar PV systems.
Criterion 3	The equipment to monitor output power of the solar PV system(s) is installed at the project site.	Five electricity meters are installed to monitor output power of the solar PV systems at the project sites.
Criterion 4	Data of fuel consumption and fuel consumed before activation of EMS and BESS is available for each fossil fuel thermal power units such as DG(s) in the power station. The data is to be collected monthly for at least one year.	Monthly data of fuel consumption and fuel consumed before activation of EMS and BESS is available for each DG in the power station in Addu City. The data is available for more than two years.
Criterion 5	The PV modules need to be certified for design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).	The PV modules are certified for design qualification IEC61215 and safety qualification IEC61730-1 and IEC61730-2.
Criterion 6	In the case of replacing the existing storage battery system (s), a plan is prepared in which mercury used in the existing storage battery system	There is no exiting storage battery system before the proposed project.

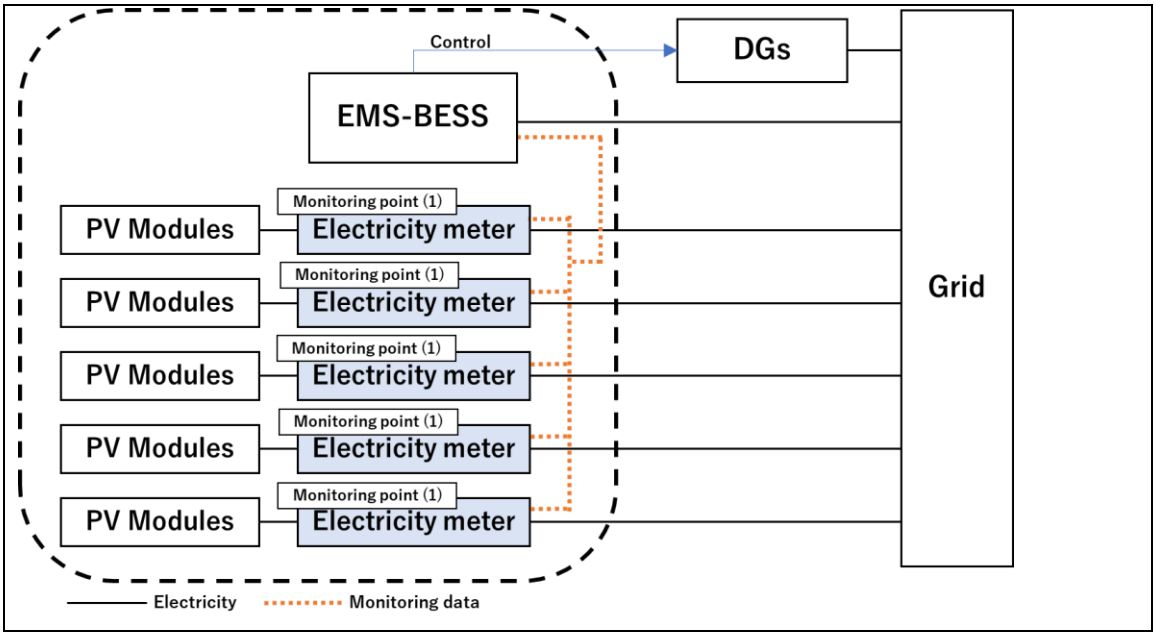
	(s) is not released to the environment. Execution of the prevention plan is checked at the time of verification, in order to confirm that mercury used for the existing one replaced by the project is not released to the environment.	

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 and/or captive 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



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_2e)	Estimated Project Emissions (tCO_2e)	Estimated Emission Reductions (tCO_2e)
2013			
2014			

2015			
2016			
2017			
2018			
2019			
2020			
2021	94.1	0.0	94
2022	1,144.5	0.0	1,144
2023	1,144.5	0.0	1,144
2024	1,144.5	0.0	1,144
2025	1,144.5	0.0	1,144
2026	1,144.5	0.0	1,144
2027	1,144.5	0.0	1,144
2028	1,144.5	0.0	1,144
2029	1,144.5	0.0	1,144
2030	1,144.5	0.0	1,144
Total (tCO_2e)			10,390

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

The stakeholders of the project are identified to be Project Participants, local government of the project site, the owners of the solar PV sites and ADB, and representatives of these organizations participated in local stakeholder consultation.

Date and time	Venue	Participants
19 Jan 2022 10:00-11:30	Online meeting	Representatives from following organizations: MoECCT, FENAKA (Headquarters and power station at site), Addu city council, equatorial hospital, Sharafuddin school, and contractor of EMS-BESS installation

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
MoECCT	This project is in line with the Maldives' policy and is expected to contribute to achieving net-zero target and reduction of cost incurred for fossil fuel import.	Positive opinion was received. No further action is needed.
FENAKA	Contribution by the project as planned is highly expected and appreciated, while power station at site needs further support from the contractor for the proper operation of EMS-BESS. Communication system (VPN) will be supported by FENAKA for better control and monitoring of EMS-BESS by the contractor.	The contractor responded that necessary training was conducted, while further consultation and support may be provided for more smooth operation of the EMS-BESS once VPN communication is well established and functioning.
Addu city	We appreciate that this project is expected to contribute to the development of Addu city. While following issues need to be addressed: Hithadhoo school has issue on tree shading over the solar PV panels, and Sharafuddin school has issues on inverter room, and water leakage at some roofs where solar PV panels were introduced.	FENAKA will take necessary actions to identify and address the issues raised.
Equatorial hospital	The project contribution on renewable energy installation is appreciated, while it is better if the hospital can be directly benefited.	MoECCT answered this project would benefit Maldives as a whole, while further collaboration by MoECCT and each project site owner may be possible to achieve more direct benefit in the future project. No further action is required.
Sharafuddin school	We are happy to be a part of the project to contribute to renewable	FENAKA will take necessary actions to identify and address the issues

	energy, while improvement is expected regarding the shift of inverter room due to a safety reason and water leakage at some roofs.	raised.

F. References
N/A

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

Annex
Letter of commitment signed by Project Participants (MoECCT and FENAKA) to address concerns raised at the local stakeholder consultation.

Revision history of PDD		
Version	Date	Contents revised
01.0	08/09/2022	First edition
02.0	06/10/2022	Second edition, submitted for public input
03.0	28/12/2022 02/09/2023	Third edition, revised based on CAR from TPE Initial registration by the Joint Committee through electronic decision