ADB

Technical Assistance Report

Project Number: 49450-028
Transaction Technical Assistance Facility (F-TRTA)
December 2020

Preparing Floating Solar Plus Projects under the Pacific Renewable Energy Investment Facility

Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
BESS	–	battery energy storage system
CEFPF	–	Clean Energy Financing Partnership Facility
FPV	–	floating photovoltaic
MW	–	megawatt
MWh	–	megawatt-hour
PIC-11	–	11 smaller Pacific island countries
PV	–	photovoltaic
TA	–	technical assistance

NOTE

In this report, "$" refers to United States dollars.

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CONTENTS

TRANSACTION TECHNICAL ASSISTANCE AT A GLANCE

1. Basic Data — **Project Number:** 49450-028

Project Name	Preparing Floating Solar Plus Projects under the Pacific Renewable Energy Investment Facility	**Department/Division**	PARD/PAEN
Nature of Activity	Project Preparation, Capacity Development	**Executing Agency**	Asian Development Bank
Modality	Facility		
Country	REG (COO, FSM, KIR, NAU, PAL, RMI, SAM, SOL, TON, TUV, VAN)		

2. Sector — **Subsector(s)**

ADB Financing ($ million)	
Total	**0.00**

3. Operational Priorities

- ✓ Accelerating progress in gender equality
- ✓ Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability
- ✓ Strengthening governance and institutional capacity
- ✓ Fostering regional cooperation and integration

Climate Change Information[1]

GHG Reductions (tons per annum)	0
Climate Change impact on the Project	Low
ADB Financing	
Adaptation ($ million)	0.00
Mitigation ($ million)	0.00
Cofinancing	
Adaptation ($ million)	0.00
Mitigation ($ million)	0.00

Sustainable Development Goals

SDG 1.5, 1.b
SDG 5.c
SDG 7.1, 7.2, 7.a
SDG 9.1
SDG 12.2

Gender Equity and Mainstreaming

Some gender elements (SGE) ✓

Poverty Targeting

General Intervention on Poverty ✓

4. Risk Categorization Low

5. Safeguard Categorization Safeguard Policy Statement does not apply

6. Financing

Modality and Sources	Amount ($ million)
ADB	**0.00**
None	0.00
Cofinancing	**2.00**
Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility (Full ADB Administration)	2.00
Counterpart	**0.00**
None	0.00
Total	**2.00**

Currency of Financing: US Dollar

[1] The project reduces greenhouse gas emissions. However, it does not fall under the eligibility criteria for climate mitigation finance as defined by the joint multilateral development bank methodology on tracking climate finance, which notes that not all activities that reduce greenhouse gases in the short term are eligible to be counted towards climate mitigation finance. Accordingly, greenfield fossil fuel projects are excluded, and climate mitigation finance is considered zero.

I. THE TECHNICAL ASSISTANCE FACILITY

A. Justification

1. The proposed transaction technical assistance (TA) facility will assess the potential for, and develop a roadmap of, financing floating photovoltaic (FPV) projects in the 11 small Pacific island countries (PIC-11).[1] The TA will conduct all required due diligence and prepare the first three FPV projects for approval in 2022–2023 under the Pacific Renewable Energy Investment Facility or PREIF (the facility) approved in 2017.[2] The proposed facility TA is included in the Pacific Regional Operations Business Plan, 2020–2022.[3]

2. The facility impact is improved energy security following the outcome of lower cost and cleaner electricity generation. The facility outputs are (i) renewable energy generation constructed, and (ii) energy sector reform undertaken. The facility's estimated cost of $750 million, comprises (i) up to $200 million in Asian Development Bank (ADB) financing, (ii) an estimated $500 million from cofinancing sources, and (iii) an estimated $50 million from government counterpart financing. ADB will consider facility projects up to July 2022, for implementation up to July 2025. The facility is generally on track to achieve the following performance indicators by 2025: (i) 80 megawatts (MW) of renewable energy generation capacity commissioned, (ii) 30 megawatt-hours (MWh) of battery storage installed, and (iii) 300 kilometers of transmission and distribution network constructed. The status of facility performance is detailed in its 2019 annual report.[4]

3. The facility is currently supported by three regional TA facilities to support project preparation, implementation, and capacity building, and energy sector and utility reforms in the PIC-11. The first TA, totaling $8.935 million, prepared eight projects which were approved in 2017–2019, and is preparing four projects for approval in 2020 and 2021.[5] The second TA, totaling $5.8 million, is on track to achieve sector reform targets under the facility.[6] The third TA of $4 million, approved in July 2019, is preparing at least four projects for approval in 2020–2023.[7] All of the TA funds are fully allocated.

4. Pacific island countries (PICs) are small island developing states that have extreme land constraints and are heavily dependent on imported fossil fuels for energy and transport.[8] Climate

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[1] The 11 countries are the Cook Islands, the Federated States of Micronesia, Kiribati, Nauru, Palau, the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Small refers to population.

[2] ADB. 2017. *Report and Recommendation of the President to the Board of Directors: Proposed Pacific Renewable Energy Investment Facility*. Manila.

[3] ADB. 2019. *Regional Operations Business Plan: Pacific, 2020–2022.* Manila. The TA is formerly programmed as additional financing to Preparing the PREIF (Phase 2) (footnote 7).

[4] ADB. 2020. *Pacific Renewable Energy Investment Facility Annual Report January–December 2019.* Manila.

[5] ADB. 2016. *Technical Assistance for Pacific Renewable Energy Investment Facility.* Manila. Four additional financing to the TA was approved in 2017–2019.

[6] ADB. 2017. *Technical Assistance for Capacity Building and Sector Reforms for Renewable Energy Investment in the Pacific.* Manila.

[7] ADB. 2019. *Technical Assistance for Preparing Pacific Renewable Energy Investment Facility (Phase 2)*. Manila.

[8] For Kiribati, over 50% (~56,000) of the population lives on the main island of Tarawa atoll with only 16 square kilometers (km^2) of land and 500 km^2 of lagoons. Over 50% (~6,000) Tuvaluans live in Fongafale on the Funafuti atoll, with only 2.8 km^2 of land and 252 km^2 of lagoons. Both islands are less than three meters above sea level and less than 500 meters wide, over which each government targets 100% renewable energy penetration by 2025. Tonga aims to achieve 70% renewable energy penetration by 2030, needing 30 MW more PV, and is open to private sector investments, particularly in the main island of Tongatapu where 75% of the population lives. Tongatapu has 260 km^2 of land and several bays and large lagoons. Funafuti needs 7.6 MW PV and 14 MWh of battery energy storage system (BESS) while South Tarawa needs 25 MW PV and 32 MWh of BESS to reach 100% penetration. Funafuti installed capacity is 1.8MW diesel and 735 kW PV (16% penetration). South Tarawa has 5.5 MW diesel and 1.5 MW PV (9% renewable energy penetration).

change and extreme geophysical and meteorological events pose additional threats to these fragile economies and worsen existing development challenges such as deterioration of infrastructure. PIC-11 have committed to investing in disaster-resilient renewable energy to address the above issues. As of December 2019, eight renewable energy projects, mainly solar photovoltaic (PV), battery storage systems, and mini grids, have been approved under PREIF and are now under implementation in Federated States of Micronesia, Nauru, Republic of Marshall Islands, Tonga, Tuvalu, and Vanuatu.

5. ADB has committed to help finance PIC-11's ambitious plans in the renewable energy generations investment. With solar PV being the least-cost energy generation technology in the PICs, the emerging FPV technology is well-placed to tap their enormous water surface and solar resource potential.[9] FPV addresses the PICs' unique challenges and vulnerabilities while limiting climate impacts. Though FPV requires stricter standards than land-based PV given its exposure to water, it has added advantages in that it (i) frees up land for other use and saves on land acquisition and preparation costs; (ii) allows higher yields due to the cooling effect of water; (iii) conserves water through reduced evaporation; (iv) has readily available water for module cleaning; (v) is quick to install; and, (vi) addresses energy-water-food-climate nexus. The cost for the floating, anchoring, and mooring system is offset by both the reduced land acquisition and preparation costs and the higher energy yield. FPV includes PV panels built on stilts above water.

6. The proposed TA will help develop a roadmap of the FPV investment in PIC-11 and to prepare FPV projects in Kiribati, Tonga, and Tuvalu for approval within 2022–2023 and for financing by either public or private sector.[10] The TA underpins ADB's Strategy 2030[11] and Pacific Approach, 2016–2020.[12] It will address vulnerabilities and needs for investment and reforms, considering current energy sector strategies and utility reforms, and may include demand-side management and efficiency measures, and value-added end-uses beyond electricity.[13] The TA will finance institutional capacity building and will develop pre-feasibility concepts for the next three FPV projects for potential ADB and private sector financing.[14] Subject to funding availability and government requests, the TA may prepare these additional FPV projects.

7. The TA will prepare gender-sensitive, energy efficient and climate-resilient FPV projects. The TA will build on lessons and recommendations from ongoing renewable energy projects in the beneficiary countries and will promote the use of innovative procurement and contracting approaches such as joint procurement of design-build-operate contracts for the public-sector funded projects. It will also consider the impact of the coronavirus disease pandemic on the power sector and the utilities in designing the ensuing projects.

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[9] As of June 2020, around 500 FPV projects totaling 1.8 GW have been installed, compared to over 505 GW global PV installed capacity. Nearshore marine FPV is nascent but large plants are being constructed in 2020 including 180 MW in Taipei,China, 5 MW in Singapore, and 4 MW in Seychelles. Austria, France, Japan, Netherlands, Norway, People's Republic of China, Singapore, Switzerland, and the United States, are global leaders in FPV.

[10] The projects are included in the forthcoming PIC-11 country operations business plan, 2021–2023. The project sites represent different water characteristics and configurations for easy replication. The utilities have experience in land-based and rooftop PV and have policies and targets to reach up to 100% renewable energy grid penetration. The TA will build on the experience from ADB-funded PV and BESS projects: Tonga Renewable Energy Project, Tuvalu Increasing Access to Renewable Energy Project and the proposed Kiribati South Tarawa Renewable Energy Project, all under the Pacific Renewable Energy Investment Facility (footnote 2).

[11] ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

[12] ADB. 2016. *Pacific Approach, 2016–2020.* Manila.

[13] These include solar-powered water supply (desalination, rainwater collection) and sanitation, greenhouses, vertical farming, aquaculture, alternative fuels, solar charging stations, clean electricity mobility, and other technologies identified in other related ADB TA.

[14] Indicatively Nauru, Marshall Islands, and Samoa, or the Federated States of Micronesia or the Solomon Islands.

8. **Project 1.** The proposed Kiribati South Tarawa Renewable Energy Project (Phase 2), for approval in 2022, will indicatively install 5 MW of floating and ground-mounted solar photovoltaic, a battery energy storage system (BESS), as needed, and associated grid infrastructure. The government is seeking $12 million grant from ADB's Asian Development Fund (ADF) and cofinancing from the Government of Australia.

9. **Project 2.** The proposed Tonga Floating Solar Project will indicatively install 5 MW of FPV in Tongatapu, through private sector financing. The TA will help structure the project for private sector financing. Subject to the project's viability, further assistance may be provided to help with the selection of independent power producers.[15]

10. **Project 3.** The proposed Tuvalu Increasing Access to Renewable Energy Project (Phase 2) for consideration in 2022 aims to install indicatively 1–2 MW of floating and rooftop photovoltaic system, a BESS, as needed, and grid infrastructure in Funafuti. Cofinancing from the Global Environment Facility and potentially from the Government of Australia are being sought.

11. **Institutional capacity building support.** The TA will supplement training and knowledge sharing events of the regional platforms like the Pacific Power Association. It will also build capacity of the relevant stakeholders on the technical, governance, safeguards, climate, and gender aspects specific to FPV. Up to 2 regional conferences and up to 2 seminars or workshops per country, with at least 20%–40% women in at least 100 participants from stakeholders including project executing and implementing agencies, will be conducted.

B. Outputs and Activities

Table 1: Summary of Major Outputs and Activities

Major Outputs	Delivery Dates Months from NTP	Key Activities with Milestones
1. Pre-feasibility studies, roadmap, and pipeline of floating solar plus projects in the PIC-11	Within 1-6 months	1.1 Assessment of theoretical and technical potential; assessment of critical vulnerabilities and needs
	Within 12 months	1.2 Identify, prioritize, and conceptualize projects for PIC-11
	Within 24-36 months	1.3 Prepare pre-feasibility studies
	Within 18-36 months	1.4 Formulate floating solar plus road map including indicative costs and timelines, and required actions and grid strengthening and value-added outputs
2. Feasibility studies and due diligence documents	Within 2 months	2.1 Optimize projects design and scope
	Within 6 months	2.2 Conduct technical, financial, economic, gender, governance, and safeguards due diligence
	Within 10 months	2.3 Submit grid integration study, feasibility studies
	Within 12-24 months	2.4 Submit facility financing proposals and linked documents
3. Institutional capacity building support and assistance to procurement	Within 2 months	3.1 Update procurement capacity, financial management, and risk management assessments
	Within 3-4 months	3.2 Conduct strategic procurement planning and recommend procurement arrangements
	Within 6-24 months	3.3 Prepare bidding documents, issue invitation for bids, assist in bid evaluation, contract negotiation and award
	Within 6-36 months	3.4 Develop and implement capacity development plans

NTP = notice to proceed, PIC-11 = 11 small Pacific island countries.
Source: Asian Development Bank.

[15] ADB's Pacific Department may invite the Office of Public–Private Partnership to provide further assistance. Financing support from ADB's Pacific Renewable Energy Program led by the Private Sector Operations Department will also be explored.

C. Cost and Financing

12. The TA facility is estimated to cost $2 million, which will be financed on a grant basis by the Asian Clean Energy Fund[16] under the Clean Energy Financing Partnership Facility (CEFPF) and administered by ADB. The key expenditure items, which are all eligible under CEFPF, are listed in Appendix 1.

13. The beneficiary governments will provide counterpart support in the form of staff, access to meeting rooms, communication facilities, and other in-kind contributions. The governments were informed that approval of the TA does not commit ADB to finance any ensuing project.

D. Implementation Arrangements

14. The TA activities for an ensuing project will start only after ADB approves the project concept paper on the ensuing project. ADB will administer the TA. The Energy Division of ADB's Pacific Department will select, supervise, and evaluate consultants. The grid-connected FPV projects will be owned, operated, and managed by the respective state-owned utilities: the Kiribati Public Utilities Board and Tuvalu Electricity Corporation; and by Tonga Power Limited based on an agreed power purchase agreement with the project sponsor. The consultants will work with the utilities and the corresponding project management units established in the respective utilities.

15. The implementation arrangements are summarized in Table 2. The TA implementation period as well as the design, scope, cost estimates, and processing and implementation period of ensuing projects may be adjusted to consider the evolving impact of the coronavirus pandemic.

16. **Consulting services.** ADB will engage consultants following the ADB Procurement Policy (2017, as amended from time to time) and its associated staff instructions. The TA facility will require 65 person-months of international consultants' and 102 person-months of national consultants' input. ADB will engage the consultant firm through quality- and cost-based selection using full technical proposal (quality to cost ratio of 90:10). Details are shown in Appendix 2.

Table 2: Implementation Arrangements

Aspects	Arrangements		
Indicative implementation period	December 2020–December 2024		
Executing agency	Asian Development Bank		
Implementing agencies	Energy Division, Pacific Department		
Consultants	To be selected and engaged by ADB		
	Firms: Quality- and cost-based selection	Project preparation consultants (1 contract)	$2.00 million
Procurement	None		
Advance contracting and retroactive financing	None		
Disbursement	The TA resources will be disbursed following ADB's *Technical Assistance Disbursement Handbook* (2020, as amended from time to time).		
Asset turnover or disposal arrangement upon TA completion	Asset turnover and disposal upon TA completion will follow ADB guidelines and procedures		

ADB = Asian Development Bank, TA = technical assistance.
Source: Asian Development Bank.

[16] Established by the Government of Japan.

17. **Cofinancier requirements.** For the preparation and implementation of the TA, core and development co-benefit indicators will be reported as required by the CEFPF, in consultation with the fund manager, ADB's Sustainable Development and Climate Change Department.

E. Governance

18. The proposed TA will include financial management assessments, procurement capacity assessments, and risk assessment and management with tasks and outputs stated in the terms of reference for consultants (Appendix 3).[17]

II. THE PRESIDENT'S DECISION

19. The President, acting under the authority delegated by the Board, has approved the Asian Development Bank administering a technical assistance not exceeding the equivalent of $2,000,000 to be financed on a grant basis by the Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility for Preparing Floating Solar Plus Projects under the Pacific Renewable Energy Investment Facility, and hereby reports this action to the Board.

[17] Terms of Reference for Consultants (accessible from the list of linked documents in Appendix 3).

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Amount
A. Asian Clean Energy Fund[a] under the Clean Energy Financing Partnership Facility	
1. Remuneration and per diem	
a. International consultants	1,073.5
b. National consultants	336.0
2. Out-of-pocket expenditures	
a. International and local travel	283.5
b. Surveys	150.0
c. Training, seminars, and conferences	70.0
d. Reports and communications	3.0
e. Equipment	9.0
f. Miscellaneous administration and support costs	3.0
3. Contingencies	72.0
Total	**2,000.0**

Note: The technical assistance is estimated to cost $2 million, of which contributions from the Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility are presented in the table. The beneficiary governments will provide counterpart support in the form of counterpart staff, office supplies, office space and communication facilities for consultants, and other in-kind contributions. The value of the governments' contribution is estimated to account for 30% of the total technical assistance cost.

[a] Established by the Government of Japan and administered by the Asian Development Bank.

Source: Asian Development Bank estimates.

PROJECTS UNDER TECHNICAL ASSISTANCE FACILITY

Table: Indicative Consultants' Input Allocation
(person-months)

Expert		**Kiribati**	**Tonga**	**Tuvalu**
Indicative risk category	**Total**	Project 1 Low risk	Project 2 Low risk	Project 3 Low risk
Solar/Renewable Energy expert/Team leader	11	4	4	3
Power systems/instrumentation expert	6	2	2	2
Battery and Grid Integration expert	4	1	2	1
Floating Photovoltaic specialist	5	2	2	1
Civil/Water Engineer	5	2	2	1
Climate change specialist	4	1	2	1
Financial specialist	3	1	1	1
Economist	3	1	1	1
Procurement specialist	5	2	1	2
Gender specialist	3	1	1	1
Social safeguards specialist	5	2	1	2
Environment specialist	5	2	2	1
Transaction advisor	3	1	1	1
Legal and Regulatory Expert	3	1	1	1
Total international experts' inputs	**65**	**23**	**23**	**19**
Electrical Engineer	30	10	10	10
Civil engineer	24	8	8	8
Environmental specialist	24	8	8	8
Social Safeguards/Gender Specialist	24	8	8	8
Total national experts' inputs	**102**	**34**	**34**	**34**

Source: Asian Development Bank estimates.

LIST OF LINKED DOCUMENTS

http://www.adb.org/Documents/LinkedDocs/?id=49450-028-TAReport

1. Terms of Reference for Consultants