



Technical Assistance Report

Project Number: 42465-01
Regional—Capacity Development Technical Assistance (R-CDTA)
July 2009

Promoting Access to Renewable Energy in the Pacific (Financed by the Multi-Donor Clean Energy Fund under the Clean Energy Financing Partnership Facility)

Asian Development Bank

ABBREVIATIONS

ADB	– Asian Development Bank
CDM	– Clean Development Mechanism
DMC	– developing member country
PNG	– Papua New Guinea
TA	– technical assistance

TECHNICAL ASSISTANCE CLASSIFICATION

Type	– Regional—capacity development technical assistance (R-CDTA)
Targeting classification	– General intervention
Sector (subsector)	– Energy (renewable energy)
Themes (subthemes)	– Economic growth (knowledge, science and technological capacities), environmental sustainability (natural resources conservation)
Climate change	– Climate change mitigation
Location impact	– Rural (high impact)
Partnership	– Multi-Donor Clean Energy Fund under the Clean Energy Financing Partnership Facility (contributors: the governments of Australia, Norway, Spain, and Sweden)

NOTE

In this report, "\$" refers to US dollars.

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I. INTRODUCTION

1. Much of the rural population in many Pacific developing member countries (DMCs) lacks access to safe, reliable, affordable, and versatile energy such as electricity. Rural electrification in Vanuatu is 7% and in the Solomon Islands 5%. Less than 10% of Papua New Guinea (PNG), predominantly urban areas, is electrified. With power often unreliable even in major urban centers, it is unlikely that many rural areas will be connected to the grid in the near future. While energy efficiency projects offer excellent cost effectiveness and can improve the energy security of Pacific DMCs, they alone will not fully address the growing energy needs of Pacific DMCs or provide access to safe, reliable, affordable, and versatile energy for the bulk of the population living in rural areas. Innovative approaches are required, such as using renewable energy.

2. The lifetime cost of renewable energy is becoming more competitive with diesel generation as new technology and mass production bring down costs. New sources of funding such as carbon credits have become available and may be leveraged to bring down the cost of renewable energy projects. Although petroleum prices have declined in recent months, they remain high by historical standards, and further price rises are likely once the world economy begins to recover. Meanwhile, the uptake of renewable energy remains low.

3. The Governments of PNG, Solomon Islands, and Vanuatu have requested assistance from ADB to promote access to renewable energy. The concept paper for the proposed TA was approved on 20 October 2008. Fact-finding was conducted in Vanuatu on 11–17 November 2008, Solomon Islands on 8–12 December 2008, and PNG on 2–6 February 2009. The governments concur with the impact, outcome, outputs, implementation arrangements, cost financing arrangements, and terms of reference. The design and monitoring framework is in Appendix 1.¹

II. ISSUES

4. The experience of ADB TA for the Promotion of Renewable Energy, Energy Efficiency, and Greenhouse Gas Abatement Projects highlights the problems and pressing issues that have faced renewable energy projects.² These are (i) a focus on larger, more glamorous development partner-driven projects at the expense of promising smaller, demand-driven products; (ii) a focus on engineering and technical issues at the expense of policy, social, and community considerations; (iii) insufficient local ownership of donated products including agency support for backup maintenance services and providing spare parts, as well as a lack of community engagement generally; (iv) limited consideration of repair and maintenance costs and issues; and (v) insufficient regulations and guidelines for energy tariffs. Such lessons from past renewable energy projects globally and in the Pacific can be used to inform improved project designs to address current energy challenges.

5. The unreliability, poor coverage, and high cost of diesel power generation in Solomon Islands is a major constraint to private sector development and economic growth. Over 80% of the rural population is without electricity. Blackouts are common. While many businesses and government offices rely on standby generators, many small and medium-sized enterprises and most microenterprises cannot afford this option. High energy costs and an increasingly problematic balance of payments have forced the Government to explore alternatives such as

¹ The TA first appeared in the business opportunities section of the ADB website on 6 April 2009.

² ADB. 2000. *Technical Assistance for the Promotion of Renewable Energy, Energy Efficiency, and Greenhouse Gas Abatement Projects*. Manila

import substitution using renewable energy. The most promising solutions to the energy problem given the natural endowments of the country are hydropower, alternative fuels, and mini hydropower for provincial centers.

6. Similarly, PNG has made little progress in rural electrification in recent years. Rural electrification is becoming a key government priority, with power likely to be added to its medium-term development strategy. In particular, the Energy Division of the Department of Petroleum and Energy and PNG Power aim to rehabilitate and in some cases replace defunct diesel generators in remote regional population centers and provide electricity in places not previously electrified.

7. Progress has been slow despite high renewable energy potential, particularly for hydropower and mini hydropower, throughout PNG. A uniform tariff across the country for electric power has tended to discourage PNG Power from expanding electrification to less profitable rural areas. Another difficulty with previous projects has been ensuring that consumers pay, which necessitates innovative solutions such as prepayment meters.

8. In contrast with other Melanesian countries, Vanuatu has high-quality power supply to the main urban centers of Port Vila and Luganville, albeit at high cost, but little electricity supplied outside of these areas. To reduce costs and free up money for rural electrification, renewable energy has been increasingly used to supply power to the grid. Unelco SUEZ, the urban concession holder, has integrated a small wind farm into the grid and is piloting coconut biodiesel generator in provincial centers. The company has developed a rural electrification master plan for the Government, and savings from an externally funded hydropower scheme in Santo are being collected in a fund administered by the Government for providing power to rural areas. However, further work is required to render both the plan and the fund operational. The Government plans to provide additional support to on-grid renewable energy, and a solar farm and an additional wind farm for Port Vila are under active consideration.

III. THE PROPOSED TECHNICAL ASSISTANCE

A. Impact and Outcome

9. The impact of the TA will be the increased use of sustainable, safe, reliable, affordable, and versatile renewable energy products by Pacific DMCs. The outcome will be the successful demonstration of selected examples of such products and their readiness for replication and scaling up.

B. Methodology and Key Activities

10. The TA will be implemented in two phases. The outputs of the TA will be
- (i) the completed design of small pilot projects for testing technology and management approaches in the first 8 months (phase 1) to be executed and completed under this TA in the second phase;
 - (ii) the completion in phase 2 of a number of pilot projects for mini hydropower in PNG, alternative fuels in Solomon Islands, and solar power in Vanuatu, and,
 - (iii) the completion of preparatory work for scaling up mini hydropower in PNG and Solomon Islands, alternative fuels in Solomon Islands, and renewable energy sources in Vanuatu in phase 2.

11. These outputs are based on careful consultation with Pacific DMC governments, and in response to direct requests from them, to ensure strong local buy-in and support as demonstrated by the memorandums of understanding agreed with the three countries during fact-finding. Capacity building and sustainability have been emphasized in the choice and design of subprojects. In addition, strong national consultant support will supplement the capacity of the implementing agencies to implement the subprojects. While previous renewable energy projects have been criticized for building pilot projects but not providing support to follow-up work, preparatory work for replication and scaling up will be an integral part of the TA design. This support will take the form of feasibility studies, including due diligence assessments of existing studies as appropriate. A pipeline of potential projects will be developed based on the results of the pilot projects, which ADB may finance after project preparatory technical assistance. Descriptions of each of the subcomponents by country are in paras 12–14.

12. In PNG, the TA will support a pilot project for mini hydropower development to supply electricity to a remote rural population center. Diesel-fueled mini-grids have been installed in a number of these centers, but the high cost of diesel, problems transporting diesel to remote sites, management issues, and the lack of maintenance have rendered most of them nonfunctional. The TA will choose a rural population center with existing power distribution infrastructure and replace the nonfunctioning diesel generator with hydropower generation. The innovative features of this project in PNG are the use of hydropower in a remote setting and prepayment meters. The TA will include (i) support for designing the hydropower system including the hydropower station itself and distribution, billing, maintenance, and management; (ii) installing the hydropower plant and distribution network where required; (iii) developing a sustainable business model; (iv) installing prepayment meters and developing a centralized collection system; (v) training national staff to manage and maintain the system; and (v) developing external maintenance contracts. For the scaling-up component, the TA will undertake screening studies for 14 mini hydropower sites identified by the Government of PNG, select 10 priority sites, and undertake prefeasibility studies and finance planning. Financing alternatives will then be assessed for implementation.

13. In Solomon Islands, the TA will support the development of alternative fuels through a pilot project potentially including (i) retrofitting an existing provincial center diesel-fueled generation system to run on alternative fuels, (ii) providing milling equipment and developing a supply chain for the sustainable provision of alternative fuel, and (iii) developing a sustainable business model, possibly including prepayment meters to improve system financial viability and efficient energy use. Support will be provided to scaling up renewable energy by (i) preparing feasibility studies for a number of small projects for generating hydropower and power from alternative fuels in provincial centers and (ii) developing a financing program to support the implementation of priority projects.

14. The Government of Vanuatu has asked ADB to support development of on-grid renewable energy to reduce the national dependence on imported diesel for power generation. The component will assist in the development of a solar farm to supply the Port Vila grid. The component will include (i) development of feasibility studies, (ii) development of a pilot on-grid solar project, and (iii) development of project financing options to upscale renewable energy for on-grid supply.

C. Cost and Financing

15. The TA is estimated to cost \$3.6 million equivalent, of which \$3.0 million equivalent will be financed as a grant by the Multi-Donor Clean Energy Fund³ under the Clean Energy Financing Partnership Facility and administered by ADB. The governments of PNG, Solomon Islands, and Vanuatu will provide an in-kind contribution of \$600,000 equivalent, or \$200,000 each. The cost estimates and financing plan are in Appendix 2.

D. Implementation Arrangements

16. The Executing Agency will be the ADB Pacific Department, which will be responsible for coordination. The implementing agencies for subprojects will be the (i) Energy Division of the Department of Petroleum and Energy in PNG; (ii) Energy Division of the Ministry of Mines, Energy, and Rural Electrification in Solomon Islands; and (iii) Energy Unit of the Ministry of Land, Energy, Rural Water Supply, Geology, and Mines in Vanuatu.

17. The TA will have a term of 3 years from August 2009 to August 2012 and require 49 person-months of international consultancy and 37 person-months of national consultancy. The outline terms of reference are in Appendix 3. Consultants will be engaged by ADB in accordance with its *Guidelines on the Use of Consultants* (2007, as amended from time to time). Consulting firms will be requested to submit full technical proposals. The ratio for selection will be 80% quality and 20% cost. It is anticipated that TA will be implemented under three separate contracts with international consulting firms, one for each country, because of the variety of tasks to be carried out and the importance of country-specific experience when operating in challenging environments such as rural PNG. Several workshops and seminars will be held under the TA to provide training and build community awareness. Consulting firm contracts will cover the administration of seminar, workshop, and pilot project funds. Equipment and materials for TA will be procured by the consultants or by ADB in accordance with ADB *Procurement Guidelines* (2007, as amended from time to time) and remain with the implementing agencies following TA completion. The proceeds of TA will be disbursed in line with the *Technical Assistance Disbursement Handbook*.⁴ Activities will be financed in PNG, Solomon Islands, or Vanuatu under this TA only after a no-objection certificate is obtained from the government of each country.

18. The final report, including pilot project completion reports, country- and technology-specific studies, and lessons learned, will be disseminated widely at regional conferences and other fora, as well as in the regional press. Jointly hosting the media at the TA commencement and completion events will ensure that people in Pacific DMCs are informed of the new renewable energy products, delivery modes, possible financing arrangements, and lessons learned. The TA will be subject to annual review by the Clean Energy Financing Partnership Facility secretariat.

IV. THE PRESIDENT'S RECOMMENDATION

19. The President recommends that the Board approve ADB administering technical assistance not exceeding the equivalent of \$3,000,000 to be financed on a grant basis by the Multi-Donor Clean Energy Fund under the Clean Energy Financing Partnership Facility for Promoting Access to Renewable Energy in the Pacific.

³ Contributors: the governments of Australia, Norway, Spain, and Sweden.

⁴ ADB. 2008. *Technical Assistance Disbursement Handbook*. Manila.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
Impact Pacific DMCs increasingly use sustainable, safe, reliable, affordable, and versatile renewable energy.	<p>Increase in the percentage of the population accessing renewable energy</p> <p>Successful replication and scaling up of renewable energy in Pacific DMCs</p>	<p>Development partner and other organization reports</p> <p>Pacific DMC government policy statements</p> <p>Development partner and other organization surveys</p>	Assumptions Indigenous communities' traditional patterns of production and consumption are not adversely affected. Sustained political will of governments for increased access to renewable energy and for a major role for the private sector in the provision of renewable energy
Outcome Sustainable, safe, reliable, affordable, and versatile renewable energy is successfully demonstrated and ready for replication and scaling up.	<p>An additional 2,000 people have access to modern energy services in Pacific DMCs with no net increase in greenhouse gas emissions.</p>	<p>Development partner and other organization reports</p> <p>Pacific DMC government policy statements</p> <p>Development partner and other organization surveys</p>	Assumptions National and regional financial institutions see renewable energy as an untapped business opportunity. Risks Weak local institutional support and flawed program adoption, particularly for off-grid applications TA is unable to identify a sufficient number of suitable opportunities for scaling up and/or application to CDM
Outputs 1. Detailed design of pilot projects is finalized. 2. Renewable energy technologies are shown to meet the energy needs of target communities. 3. Preparatory work for scaling up renewable energy technologies is completed.	<p>Detailed feasibility studies are produced for three pilot projects.</p> <p>All households included in pilot projects that are willing to pay a sustainable tariff for reliable energy services have access to electricity.</p> <p>Feasibility studies and financing options are available for five renewable energy projects.</p> <p>Priority sites for off-grid electricity expansion are identified, feasibility studies are completed, and financing options are identified.</p> <p>Funds are available to support the development and expansion of priority renewable energy projects.</p>	<p>ADB TA reports and other project documentation</p> <p>Government reports and national energy statistics</p>	Assumptions There will be sufficient coordination and harmonization among development partners so that national counterparts retain sufficient capacity for project requirements. Private sector perceives renewable energy projects as financially viable. Pilot projects are not delayed by internal conflicts or security problems. Risks Limited availability of adequate human and financial resources Resource risks due to weather and natural disasters Local communities do not take ownership of pilot projects Pilot projects do not successfully identify sustainable delivery models, and local communities do not access new energy sources.

Activities with Milestones	Inputs
<p>Phase 1 (months 1–8)</p> <ol style="list-style-type: none"> 1.1 Desk study; stock taking of recent, current, and planned renewable energy initiatives; mission planning; and identification of renewable energy opportunities, partners, and other stakeholders 1.2 Suitable locations for pilot projects and possible larger projects for scaling up are identified. 1.3 Feasibility studies are prepared for pilot project sites. 1.4 Missions to obtain stakeholder feedback on feasibility studies and to finalize selection of precise pilot project locations and details 1.5 Pilot project plans developed, produced, and disseminated 2.1 Draft list of possible projects for scaling up based on opportunities identified through other phase 1 activities <p>Phase 2 (months 8–36)</p> <ol style="list-style-type: none"> 3.1 Training needs assessment, due diligence, and procurement plans are completed; required legal approvals for pilot projects are obtained; and memoranda of understanding are signed. 3.2 Three finalized detailed project plans for pilot projects, included costing and documentation for all elements listed in activity 3.1 4.1 Three pilot projects commenced, including securing financial products; procuring consultants, and local counterpart contributions; installing generating capacity and disseminating renewable energy; liaising with, and promoting commercial activities to, the private sector, financial institutions, and beneficiaries; and commencing monitoring and evaluation 4.2 Three pilot projects finalized and reviewed, with a particular focus on sustainability, and completion reports drafted 5.1 Five feasibility studies and financing options are prepared for renewable energy projects. 5.2 Two CDM applications are complete for selected scaled-up projects 6.1 Draft final report including pilot project completion reports, country- and technology-specific studies, and lessons learned 6.2 Missions to obtain stakeholder feedback on draft final report and to finalize dissemination plan 7.1 Workshops and seminars held during missions throughout TA to enhance the capacity of government officials, private sector and Civil Society Organization representatives, financial institution representatives, and other stakeholders to implement renewable energy access programs 7.2 Media campaign to raise awareness of the benefits of renewable energy 	<p>Significant inputs by ADB staff for TA management</p> <p>Annual review by Clean Energy Financing Partnership Facility secretariat</p> <p>49 person-months of international consultancy</p> <p>37 person-months of national consultancy</p> <p>Commensurate efforts by national counterparts in implementing TA activities and providing guidance to implement pilot projects</p> <p>Carbon trading mechanisms, including Future Carbon Fund, Asia Pacific Carbon Fund, CDM, and alternative markets, to intermediate carbon credit funding where possible</p> <p>Multi-Donor Clean Energy Fund under the Clean Energy Financing Partnership Facility TA funding contribution of \$3 million</p>

ADB = Asian Development Bank, CDM = Clean Development Mechanism, DMC = developing member country, TA = technical assistance.

Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
(\$'000)

Item	Amount
A. Multi-Donor Clean Energy Fund under the Clean Energy Financing Partnership Facility^a	
1. Consultants	
a. Remuneration and Per Diem	
i. International Consultants (49 person-months)	1,160
ii. National Consultants (37 person-months)	137
b. International and Local Travel	140
2. Pilot Projects	1,159
3. Reports, Communications and Publications	30
4. Seminars and Workshops	59
5. Contingencies	300
6. Contract Negotiations	15
Subtotal (A)^b	3,000
B. Pacific Developing Member Country Financing^c	
1. Papua New Guinea Government	200
2. Solomon Islands Government	200
3. Vanuatu Government	200
Subtotal (B)	600
Total	3,600

^a Contributors: the governments of Australia, Norway, Spain, and Sweden, and administered by ADB.

^b Approximately one-third will be allocated for Papua New Guinea, Solomon Islands and Vanuatu.

^c Counterpart financing will include in-kind contribution of dedicated office facilities, transport, logistic support, and national counterpart staff time.

Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

A. Papua New Guinea

1. **Hydropower Engineering Specialist and Team Leader** (international, 9 person-months). The specialist will have experience working with governments and communities in renewable energy projects for rural electrification in Pacific island countries, preferably Papua New Guinea (PNG). The team leader will manage and coordinate TA implementation in PNG.
2. Under phase 1, the team leader will
 - (i) collect and review existing background data, including taking stock of recent, current, and planned micro-hydro initiatives and initial consultation with stakeholders;
 - (ii) review the pilot project feasibility study commissioned by the Department of Petroleum and Energy by conducting a site visit, validating assumptions made, and verifying data;
 - (iii) update the feasibility study if required to ensure that the micro-hydro system design meets standards;
 - (iv) prepare a project design and implementation plan including the technician training program, design of the prepayment system and tariff structure, installation of equipment and works, monitoring, and compliance with relevant national development approvals;
 - (v) assist the Department of Petroleum and Energy with drawing up service contracts to ensure that ongoing repairs and maintenance and the timely procurement of spare parts continues beyond the life of the project;
 - (vi) develop a training program and manual for pilot project technicians;
 - (vii) ensure that the financial assessments of the renewable energy projects are carried out successfully and are of appropriate quality; and
 - (viii) make necessary changes based on inputs from stakeholder consultations.
3. Under phase 2, the team leader will
 - (i) oversee the installation of micro-hydro equipment and works at the pilot project site;
 - (ii) monitor pilot project progress with periodic visits;
 - (iii) prepare a brochure for the pilot project in accordance with ADB standards;
 - (iv) organize a micro-hydro seminar for government officials and other stakeholders;
 - (v) prepare a list of projects for scaling up;
 - (vi) prepare, together with the financial specialist, detailed feasibility studies for projects;
 - (vii) prepare carbon credit funding applications;
 - (viii) identify various financing, management, and maintenance arrangements to promote project sustainability, including private sector involvement;
 - (ix) prepare a memorandum of understanding with sign-off from all stakeholders;
 - (x) draft a final report including pilot project completion reports, country- and technology-specific studies, and lessons learned; and
 - (xi) finalize the final report based on consultations with stakeholders and ADB.
4. **Financial Specialist** (international, 2 person-months). The specialist will have strong experience in designing and managing renewable energy projects in developing countries. In phase 1, the specialist will (i) assess the financial feasibility of the pilot project, determine an appropriate tariff structure, design a cost-effective prepayment system, identify all risks to project revenues and costs, and conduct relevant sensitivity analyses and (ii) develop clear mechanisms, strategies, and an overall structure for the financial management of projects to promote transparency and long-term sustainability in compliance with ADB procedures. In phase 2, the

specialist will review engineering studies and conduct detailed financial assessment of the renewable energy projects identified for scaling up, including least-cost financing options.

5. **Procurement Specialist** (international, 1 person-month). The procurement specialist will have experience in procuring micro-hydro systems. Under phase 1, the specialist will develop a detailed procurement plan for the pilot project, including a list of procurement packages and modes of procurement, and prepare outline bid documents in accordance with ADB *Procurement Guidelines* (2007, as amended from time to time) for each of the procurement packages.

6. **Rural Electrification Engineer** (national, 20 person-months). The engineer will have experience working with governments, the private sector, and local communities. The position will be based in Port Moresby and require frequent site visits. The engineer will

- (i) support the team leader and project team in (a) arranging travel logistics, (b) arranging meetings and workshops, (c) maintaining contacts with stakeholders, (d) obtaining relevant country background data for initial assessments, and (e) obtaining follow-up technical data;
- (ii) support the Government in coordinating and implementing TA activities;
- (iii) take the lead in all required stakeholder consultations;
- (iv) assist in coordinating communications between the team and the Government;
- (v) support the team leader in developing and implementing technician training;
- (vi) monitor pilot project progress with bimonthly visits to the site;
- (vii) help prepare and implement workshops and dissemination activities; and
- (viii) perform other tasks as agreed during the inception mission.

B. Solomon Islands

7. **Rural Electrification Specialist and Team Leader** (international, 9 person-months). The international rural electrification specialist will have experience working with governments and communities in the development of rural electrification projects, preferably in the Pacific. The team leader will be responsible for managing TA implementation in Solomon Islands. The proposed allocation is 6 months for phase 1 and 2 months for phase 2.

8. Under phase 1, the team leader will

- (i) collect and review existing background data and reports on the use of coconut oil for power generation and conduct an initial round of stakeholder consultations to assess the current status of power generation with coconut oil in Solomon Islands;
- (ii) select and prepare prefeasibility studies for two sites based on the background assessment and discussions with government officials;
- (iii) prepare a feasibility study in collaboration with the biofuel, transmission, and financial specialists for the site with the greatest potential for coconut biofuel power generation based on the results of the prefeasibility studies and consultation with the government officials and other stakeholders;
- (iv) ensure that the financial assessments of the renewable energy projects are carried out successfully and are of appropriate quality;
- (v) design a purchase agreement with the local mills to ensure medium- to long-term supply, as applicable, and obtain all relevant national approvals for the proposed development.

9. Under phase 2, the team leader will

- (i) monitor pilot project progress by conducting periodic visits to the site;

- (ii) maintain ongoing engagement with project technicians over the 3-year project period to develop national capacity to operate and maintain the generator;
- (iii) prepare a brochure for the pilot project in accordance with ADB standards;
- (iv) organize a coconut oil biofuel seminar in Honiara after completing project construction to inform stakeholders of project completion and key outcomes;
- (v) work closely with the Government and Solomon Islands Electricity Authority to (a) identify 10 sites for scaling up coconut oil power generation and 10 potential hydropower sites, (b) screen the sites, and (c) select five priority sites for coconut oil power generation and five priority sites for hydropower;
- (vi) prepare prefeasibility studies in collaboration with the biofuel, hydropower, and financial specialists for the 10 priority sites;
- (vii) consult with the biofuel, hydropower, and financial specialists to identify financing, management and maintenance, and coconut oil supply arrangements to promote project sustainability, including assessment of the potential for private sector involvement in renewable energy projects;
- (viii) prepare carbon credit funding applications for larger projects under development;
- (ix) prepare and complete a memorandum of understanding with stakeholders;
- (x) prepare a draft final report including pilot project completion reports, country- and technology-specific studies, and lessons learned; and
- (xi) finalize the final report based on consultations with stakeholders and ADB.

10. **Biofuel Specialist** (international, 3 person-months). The biofuel specialist will have experience with the development of biofuels for electricity generation, preferably coconut oil. The proposed allocation is 2 months for phase 1 and 1 month for phase 2.

11. Under phase 1, the biofuel specialist will

- (i) determine the minimum coconut oil quality standards necessary to fuel the new generator and assess the quality of coconut oil produced by existing local mills;
- (ii) if locally produced coconut oil is unavailable or does not meet quality standards, evaluate and document the efficiency and output of the current coconut crushing mill with regard to its potential for providing coconut oil in adequate quantity and of adequate quality for the new generator on an ongoing basis;
- (iii) consider the parameters and design for a tank of adequate capacity for bulk storage and conditioning of coconut oil, taking into account the need to prefilter, filter, heat, and transfer oil by pump to a day tank attached to the generator;
- (iv) prepare procurement packages and a procurement plan for the pilot project based on technical data in the feasibility study;
- (v) commission and install the coconut oil storage tanks;
- (vi) develop a training program and manual for pilot project technicians (training will include initial on-site capacity development for operation, basic maintenance of and repairs to the biofuel generator, and troubleshooting); and
- (vii) participate in the coconut oil biofuel seminar to raise awareness of the benefits of generating power with coconut oil.

12. Under phase 2, the biofuel specialist will assist the team leader in selecting sites for scaling up coconut oil power generation and prepare detailed prefeasibility studies in collaboration with the team leader for the five sites identified.

13. **Distribution Specialist** (international, 1 person-month). The transmission specialist will have experience in designing and constructing small, rural transmission and distribution grids in developing countries, preferably in the Pacific. The transmission specialist will

- (i) monitor electricity demand to develop load curves for at least 1 week;
- (ii) survey the existing distribution system to identify and document any problems, substandard connections, or other technical issues relating to power transmission and resolve any transmission line weaknesses or connection faults;
- (iii) determine the power demand of any new connections that would be necessary to fully power households in the project site and establish new connections to increase access to the grid;
- (iv) design prepayment meter installations for urban areas; and
- (v) install prepaid meters at each end user and conduct training for households included in the pilot project on the use of them.

14. **Hydropower Specialist** (international, 1 person-month). The international hydropower specialist will have significant demonstrable experience working with governments and communities to develop rural hydropower projects, preferably in the Pacific region. In phase 2, the specialist will (i) assist the team leader in selecting sites for developing hydroelectric power and (ii) prepare prefeasibility studies in collaboration with the team leader for the five sites identified.

15. **Financial Specialist** (international, 2 person-months). The specialist will have a financial background in the design and management of renewable energy projects in developing countries. In phase 1, the specialist will (i) determine the financial feasibility of the pilot project, determine an appropriate tariff structure, identify risks to project revenues and costs, and conduct sensitivity analyses and (ii) develop clear mechanisms, strategies, and an overall structure for the financial management of projects to promote transparency and long-term sustainability. In phase 2, the specialist will (i) review engineering studies for scaled-up renewable energy projects and provide cost details for all project components and (ii) conduct detailed financial assessment of the renewable energy projects including least-cost financing options.

16. **National Power Systems Engineer** (national, 9 person-months). The engineer will have experience in diesel-fueled generator systems and preferably in operating modified coconut biofuel generators. The position will be based in Honiara and require frequent site visits. The proposed allocation is 6 months for phase 1 and 3 months for phase 2. The engineer will

- (i) support the team leader in TA implementation;
- (ii) assist the project team in (a) arranging travel logistics, (b) arranging meetings and workshops, (c) maintaining contacts with stakeholders, (d) obtaining relevant country background data, and (e) obtaining follow-up technical data;
- (iii) support the Government in coordinating and implementing TA activities;
- (iv) take the lead in all required stakeholder consultations;
- (v) assist in communications between the team and participating country governments;
- (vi) support the team leader in the development and implementation of training;
- (vii) monitor pilot project progress with regular visits to the pilot project site;
- (viii) help prepare and implement workshops and dissemination activities; and
- (ix) perform other tasks as agreed during the inception mission.

C. Vanuatu

17. **Solar Power Engineer and Team Leader** (international, 9 person-months). The specialist will have experience in implementation of on-grid solar power projects. The team leader will

- (i) manage and coordinate TA implementation in Vanuatu;
- (ii) liaise with all stakeholders;
- (iii) analyze potential sites for establishment of the solar power project;
- (iv) conduct feasibility study of the selected solar power project;

- (v) deliver (a) an inception report by the end of month 1, (b) an interim report by the end of month 4, (c) a draft final report by the end of month 6, and (d) a final report by the end of month 12.
18. **Procurement Specialist** (international, 2 person-months). The procurement specialist will
- (i) Identify information required and organize for surveys and capture of all data necessary for the preparation of subproject bid.
 - (ii) Prepare and complete technical designs, including bills of quantities and provision of detailed cost estimates for subprojects.documents.
 - (iii) Prepare specifications for the purchase of equipment and materials.
 - (iv) Prepare bidding documents for subprojects following ADB *Procurement Guidelines* (2007, as amended from time to time) and using standard bidding documents and guidelines.
 - (v) Evaluate bids and prepare bid evaluation reports, including recommendations for contract awards.
 - (vi) Prepare the necessary documentation for contract signing, mobilization, and withdrawal applications.
19. **Renewable Energy Specialists** (international, 8 person-months). The specialists will conduct training and assist in implementing priority projects. The specific skills required and the number of separate contracts will be determined during TA implementation.
20. **Power Sector Specialist** (national, 8 person-months). The specialist will have experience in the Vanuatu power sector but should not currently be a government official. The position will be based in Vanuatu. The specialist will
- (i) support the team leader;
 - (ii) assist the project team in (a) arranging travel logistics, (b) arranging meetings and workshops, (c) maintaining contacts with stakeholders, (d) obtaining relevant country background data for initial assessments, and (e) obtaining follow-up data;
 - (iii) support the Government in coordinating and implementing TA activities;
 - (iv) take the lead in all required stakeholder consultations;
 - (v) assist in communications between the team and the country governments;
 - (vi) support the team leader with technician training;
 - (vii) monitor pilot project progress by conducting regular visits to the site; and
 - (viii) perform other tasks as agreed on during the inception mission.

D. Reporting

21. The TA will be implemented from August 2009 to August 2012. The team will submit an inception report 6 weeks after TA commencement. Progress reports will be submitted at the conclusion of phase 1 (8 months after TA commencement), 12 months after, and every 3 months thereafter. The initial progress report will include a detailed feasibility study for the three pilot projects. A comprehensive draft final report will be submitted at least 6 weeks prior to the final tripartite meeting. A final report will be submitted 4 weeks after the receipt of comments.