Medium-Sized Project Brief

A PROJECT SUMMARY

PROJECT IDENTIFIERS	
1. Project Name: Fiji Renewable Energy Hybrid Power Systems	**2. GEF Implementing Agency: UNDP**
3. Country in which the project is to be implemented: Fiji	**4. Country eligibility**: Ratified UNFCCC on 25 February, 1993
5. GEF focal area(s): Climate change.	**6. Operational programme:** #6- Promoting the Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs.

7. Project linkage to national priorities, actions plans and programmes:

The Government of Fiji attaches great importance to sustainable development and the protection of natural resources. In line with this, the Government has recently drafted Fiji's Sustainable Development Bill, which among other things, plans to set up a Climate Change Unit to formulate and implement the country's climate change strategy and action plan. Under the ongoing UNDP/GEF enabling activity the Pacific Island Climate Change Programme (PICCAP), the Government of Fiji is preparing its national communication to the UNFCCC.

Energy is a key sector in Fiji. The Department of Energy (DOE) is responsible for national energy policies, energy conservation and renewable energy implementation, and rural electrification. DOE has the official mission to facilitate the development of a resource efficient, cost effective and environmentally sustainable energy sector in Fiji. Among its established programs are Renewable Energy Development, Energy Conservation, and Rural Electrification. Among the objectives of the DOE are the promotion of the development of indigenous renewable energy to replace current fossil fuel use (diesel fuel), and the establishment of appropriate policies and programs to minimize Government involvement in the provision of energy services and maximize private sector involvement.

Recently the DOE, with Public Works Department (PWD), completed the installation of a 720 kWh/day Renewable Energy Hybrid Power System in Nabouwalu. The system was designed by the Pacific International Center for High Technology Research (PICHTR), a private not-for-profit institute located in Hawaii. The renewable energy equipment (inverter/controller, wind turbine generators, PV panels and battery) was donated by the Ministry of Foreign Affairs (MOFA) of the Government of Japan through PICHTR. The hybrid system, which includes wind turbine generators and solar PV panels, can supply approximately 80% of the electricity load with the balance supplied with diesel generators. As of January 29, 1998, Fiji DOE assumed ownership of the $600,000 system donated by MOFA.

At present, the renewable energy hybrid system in Nabouwalu is installed and operated by PWD, and the electricity price is charged at Fiji Electricity Authority (FEA) grid price. The current institutional framework does not provide any incentives for PWD to charge a fee that can recover their full costs, and increase the operational efficiency. As a result, PWD operates at a huge economic loss. This situation prevents a widespread utilisation of renewable energy in Fiji. The DOE is taking steps to develop private sector capability in the energy sector. For example, all DOE's energy conservation projects are now contracted to the private sector under a competitive tendering process.

8. GEF national operational focal point and date of country endorsement: Mr. Rishi Ram, Permanent Secretary for Local Government, Housing and Environment; Endorsed: February 11, 1998.

PROJECT OBJECTIVES AND ACTIVITIES	
9. Project rationale and objectives: The project is aimed to reduce CO_2 emissions through setting up a sustainable institutional framework to accelerate commercial utilization of renewable energy hybrid systems to substitute for current use of diesel generators in Nabouwalu, for replication in other parts of Fiji.	**Indicators:** 1. Commercial operation of the Nabouwalu system by the Rural Energy Service Company that charges a full costs fee for the electricity supplied; 2. Increased and sustained demand for renewable energy systems in Fiji; 3. Decreased diesel use for rural electrification in Fiji. (Impossible to achieve at the macro-level)
10. Project outcomes: By the end of the project there will be: 1. A commercial and sustainable Rural Energy Service Company (ESCO) set up to run the Nabouwalu system and replicate it in five other government centres 2. A sustainable legal, regulatory, and financial framework established for the Rural Energy Service Company; 3. Increased information and awareness of renewable energy systems; 4. Improved assessment of renewable resources.	**Indicators:** 1. More hybrid systems are run by ESCO's in Fiji 2. The Rural ESCO will run the Nabouwalu system on a commercial basis, and provide reliable maintenance services; 3. A regulation Charter for Rural Energy Service Company is drafted; 4. Increased interest in renewable energy systems 5. Improved renewable energy resource data will become available.
11. Project activities to achieve outcomes: 1. Establish the legal and regulatory framework for the Rural Energy Service Company ($120,000); 2. Establish the financial framework for the Rural Energy Service Company ($100,000); 3. Develop investment plan for the Rural Energy Service Company ($50,000); 4. Training ESCO staff and managers in business management skills ($30,000); 5. Training ESCO staff in installation and maintenance of the renewable system ($85,000); 6. Establish a public awareness program in Rural Electrification Unit (REU) or work with existing expertise to disseminate information on renewable energy ($100,000); 7. Capacity building for DOE on renewable resource assessment techniques ($120,000); 8. Training DOE staff in equipment testing and technical specifications ($30,000)	**Indicators:** 1. A regulation Charter for Rural Energy Service Company is drafted; 2. The ESCO can charge and collect a fee to recover its full economic costs; 3. Information on potential investors and investment opportunities is available; 4. Commercial management of the rural ESCO; 5. Reliable maintenance service provided; 6. Increased public interests in renewable energy systems; 7. Improved renewable energy resource data are available; 8. All renewable energy systems are met with quality assurance.
12. Estimated Budget: PDF: $14,490 GEF: $740,000 Co-financing: **$600,000** from FDOE/Government of Japan for the renewable hybrid system at Nabouwalu; $70,000 from FDOE (in-kind)	
13. Information on Project Proponent: Fiji Department of Energy (DOE). See item 7.	
14. Information on proposed executing agency (if different from above): Fiji DOE	
15. Date of initial submission of project concept: 11 February 1998	

INFORMATION OF INSTITUTION SUBMITTING THE BRIEF
16. Project identification number: FIJ/98/G41/A/1G/99
17. Implementing agency contact person: Nandita Mongia, Regional GEF Coordinator for Climate Change
18. Project linkage to implementing agency programme: This project was developed after the framework for the UNDP programme of assistance was negotiated with the Government of Fiji. It will however link closely with the Fiji Greenhouse Gas (GHG) Inventory Study which is part of the regional UNDP/GEF Pacific Island Climate Change Programme (PICCAP) executed by the South Pacific Regional Environment Programme.

B PROJECT DESCRIPTION

RATIONALE AND OBJECTIVES

Project Objectives This project is aimed to reduce greenhouse gas emissions through setting up a sustainable institutional framework to accelerate commercial utilization of renewable energy hybrid power systems to substitute for current use of diesel generators in Nabouwalu, for replication in other parts of Fiji.

Project Rationale The major energy-related agencies in Fiji are the Department of Energy (DOE) and Public Works Department (PWD) within the Ministry of Communication, Works, and Energy. DOE is solely responsible for national energy policies, energy conservation and renewable energy implementation, and rural electrification.

One of the schemes considered under the 1993 Rural Electrification Policy (RE Policy), as implemented by the Rural Electrification Unit (REU) within the DOE, refers to the diesel generators operated by the Public Works Department (PWD) at the five government stations in Kadavu (Vunisea), Lakeba (Tubou), Rotuma (Ahau), Taveuni (Waiyevo), and Vanua Levu (Nabouwalu). These fossil fuel generators supply electricity to government offices, community hospitals, public institutions, stores, ice houses and surrounding villages. Electricity is supplied through mini-grids of a few kilometers in length, with the loads ranging from 500 kWh/day to 1000 kWh/day. Approximately .75 kg of CO_2 = 1kwh i.e 500-1000kWh/day = 375-750 kg of CO_2 is emitted daily.

Recently the FDOE, with Public Works Department (PWD), completed the installation of a 720 kWh/day Renewable Energy Hybrid Power System in Nabouwalu. The system was designed by the Pacific International Center for High Technology Research (PICHTR), a private not-for-profit institute located in Hawaii. The renewable energy equipment (inverter/controller, wind turbine generators, PV panels and battery) was donated by the Ministry of Foreign Affairs (MOFA) of the Government of Japan through PICHTR. The hybrid system, which includes wind turbine generators and solar PV panels, can supply approximately 80% of the electricity load with the balance supplied with diesel generators. As of January 29, 1998, Fiji DOE assumed ownership of the $600,000 system.

At present, the renewable energy hybrid system in Nabouwalu is installed and operated by PWD. The electricity price is charged at the Fiji Electricity Authority (FEA) grid price, which is much lower than the full economic cost. The central government pays off PWD's operational costs, including its staff and the fuel costs, and the fee collected goes back to the central government. Thus, the current institutional framework does not provide any incentives for PWD to charge a fee that can recover their full economic cost, and run the system efficiently. As a result, PWD operates the Nabouwalu system at a huge economic loss. This situation prevents a widespread utilisation of renewable energy in Fiji. DOE is taking steps to develop private sector capability in the energy sector. For example, all DOE's energy conservation projects are now contracted to the private sector under a competitive tendering process. DOE determines to promote private sector involvement in rural electrification in the future.

In addition to the five government stations, which serve as mini-grids, about 900 villages, approximately 300,000 people, do not have access to electricity in Fiji. In 1993, a revised Rural Electrification Policy (RE Policy) was endorsed by the Cabinet. Under this policy, any rural dweller is entitled to request for Government assistance for electrification of their village. A Rural Electrification Unit (REU) was set up within DOE to facilitate the implementation of the RE Policy. Unlike the old policy where a diesel scheme was the only option available, consumers are now given three choices -- diesel scheme; extension of the FEA grid/government station; renewable energy (solar lighting/small hydro). Under the terms of the revised RE Policy, the applicants are required to pay 10% of the total capital costs for the provision of electricity while the Government subsidizes the remaining 90%.

In 1997, the Government allocated F$1 million (equivalent to US$ 500,000) to provide electricity service to 32 villages, among which 14 was stand-alone diesel scheme, 16 from extension of FEA grid, 2 from extension of government station (mini-grid), and only 1 was solar scheme.

Presently, PWD is responsible for the construction of the diesel/solar schemes. DOE considers that undertaking this activity through a competitive bidding process would increase the efficiency and reduce the costs. Although DOE has been implementing the rural electrification policy since 1993, the newly-established REU has no staff.

The level of funding allocated by the Ministry of Finance (F$1 million per year) is insignificant as compared to the number of applications for rural electrification already received (900 villages). Given the current level of funding, if it were left solely to the DOE, it will take more than 30 years to provide power service to rural areas in Fiji.

This project is intended to set up a commercial Rural Energy Service Company (ESCO) that charges a fee for the electricity supplied to the consumers as a sustainable institutional framework to operate the renewable energy system in Nabouwalu, for replication in other parts of Fiji. The commercial operation of the renewable-energy-based Rural ESCO is expected to reduce the operation and maintenance costs, mobilize more funding for rural electrification, thereby promoting widespread utilization of renewable energy in Fiji.

Rationale for GEF Financing The operational experience from Nabouwalu renewable energy hybrid system demonstrates that such a renewable system is technically viable, and can reduce diesel consumption by 80%. However, the widespread adoption and operation of such a renewable power system is hindered by institutional, economic, financial, and informational barriers. This project, in line with GEF Operational Programmed No. 6, will remove these barriers, thereby leading to wide-scale commercial operation of renewable energy systems to replace current diesel generators in the government stations and provide electric power service to the 900 unelectrified villages. The result will be a reduction in diesel imports for rural electrification and a reduction in Fiji's CO_2 emissions.

National Priority The Government of Fiji attaches great importance to sustainable development and the protection of natural resources. In line with this, the Government has recently drafted Fiji's Sustainable Development Bill, which plans to set up a Climate Change Unit to formulate and implement the country's climate change strategy and action plan. Under the ongoing UNDP/GEF enabling activity -- the Pacific Island Climate Change Programme (PICCAP), the Government of Fiji is preparing its national communication to the UNFCCC. Fiji has set the carbon emission target to maintain 1990 emission level by the year 2005.

Energy is a key sector in Fiji. DOE has the official mission to facilitate the development of a resource efficient, cost effective and environmentally sustainable energy sector in Fiji. Among its established programs are Renewable Energy Development, Energy Conservation, and Rural Electrification. Among the objectives of the DOE are the promotion of the development of indigenous renewable energy to replace current fossil fuel use (diesel fuel), the establishment of appropriate policies and programs to minimize Government involvement in the provision of energy services, and to maximize private sector involvement.

National Interests The development of renewable energy as an alternative to diesel fits well with Fiji's economic and social priorities. Renewable Energy would reduce the need for imported petroleum products, which represent a major drain on Fiji's foreign reserves. The resulting reduction in emissions would diminish health and environmental hazards. Renewable Energy would also provide the means of extending non-diesel energy services to people in remote villages. The project will support DOE priorities of developing private sector capability in the energy sector, including rural electrification, and involving the private sector in project implementation.

Replication Potential As a result of replication made possible by this project, the other four government stations would also install and operate renewable energy hybrid systems to replace current diesel generators. As a result, 60,000 gallons (200 tonnes) of diesel consumption would be reduced, US$120,000 could be saved from diesel imports, and 170 tonnes of carbon emissions could be cut. In addition to the five government stations, without the project, a majority of the 900 villages would choose diesel schemes for rural electrification. After this project removes all the key barriers, the proposed Rural Energy Service Company could replicate the mechanism and extend their service to the 900 unelectrified villages. Thus, 4.5 million gallons (15,000 tonnes) of diesel consumption would be reduced, US$9 million from oil imports would be saved, and 13,000 tonnes of carbon emission could be avoided. In addition, the commercial operation of renewable energy systems by the Rural ESCO to be set up in this project would have a wide replication in other remote islands and areas of the world, therefore regional effort is required to disseminate the experience.

CURRENT SITUATION

Current Situation in Fiji Fiji is a large Pacific Island economy, with a land area of 18,727 km^2, a population of about 800,000, and a per capita income of about US$2,470. Most of the population and economic activity is concentrated on two large islands – Viti Levu and Vanua Levu. In addition to these two largest islands, Fiji has at least 320 islands, of which approximately 150 are inhabited.

Fiji is currently highly dependent on import of petroleum products, which provide 43% of the nation's energy supply. Next to petroleum products, industrial residues account for 34% of the total energy supply, followed by fuelwood (17%). For power generation, petroleum products account for about 50% of the nation's total installed capacity; the remaining electricity is provided by hydropower (40%) and bagasse (10%). The nation's electricity demand has grown at 5% per year for the past decade.

Currently, there exist great opportunities to introduce commercial Rural Energy Service. One of DOE's priorities is to reduce government involvement in the provision of energy services through the establishment of appropriate policies and programs and promotion of private sector involvement. PWD is expected to become a commercial entity soon, operating under a limited budget. They are facing the challenges to increase operational efficiency and reduce the costs at the government stations. PWD showed a great deal of interest in participating in the competitive bidding for the proposed Rural ESCO. Some other private companies also showed interest in operating the government stations. On the top of this, Fiji Electricity Authority (FEA) is under reorganization and restructuring, which will pave the road for the establishment of the proposed Rural ESCO. In addition, another crucial stakeholder Native Land Trust Board (NLTB) is also under reorganization. The successful restructuring of NLTB would reduce a significant risk to the proposed rural ESCO.

FEA Reorganization FEA, which was a wholly government-owned statutory authority, is responsible for the generation, transmission, and distribution of electric power in Fiji. FEA supplies electricity to all urban areas and some rural areas that are close to the grid. Current FEA grid electricity price is 22 F cent/kWh (equivalent to 11 US cent/kWh).

FEA is currently under reorganization, turning towards privatization. The restructured FEA will consist of three commercial companies: Generation Company of Fiji Ltd, for the generation area of the FEA; Electricity Corporation Ltd. (Transmission) for the transmission and distribution areas; and Fiji Electricity Distribution Company Ltd. for the selling and retailing of electricity to the customers. The Government will have more than 50% share in the Generation and Distribution Company, while the Transmission Company will be wholly government-owned. The Electricity Act is currently being re-drafted. The regulation Charter on the reorganization and restructuring FEA, which has recently been accepted by the Cabinet, will pave the road for the proposed legal and regulatory framework to be set up in this project to facilitate the establishment of the Rural Energy Service Company.

NLTB Restructuring Another important stakeholder in this project is Native Land Trust Board (NLTB) and local landowners. In Fiji, about 83% of the total land area is owned by Fijians in communal tenure. Fijian land may, through the NLTB, be leased by anyone. The NLTB is the body with whom the landowners have entrusted the management of their land. Any development project on native land has to negotiate with NLTB for land acquisition. For the Nabouwalu renewable energy system, the Lands Department has signed a 30-year land lease with the local landowners through NLTB.

NLTB has lost some of its credibility in the past few years due to delay in payments and miscommunication between the Lands Department and local landowners. Fortunately, NLTB is currently under restructuring to trim the organization, reduce costs, and rebuild its credibility.

Renewable Energy Resources While solar radiation patterns have not been mapped out, it appears that excellent solar conditions exist in some parts of Fiji, particularly along the sunny coastal areas. DOE, in coordination with Fiji Meteorological Service and the then Forum Secretariat Energy Division, has installed some measurement instruments at several sites, however, little analysis of existing sunshine hours and solar radiometric data has been carried out.

Fiji has limited wind resource data. DOE has several wind monitoring stations. The then Forum Secretariat Energy Division initiated the South Pacific Wind and Solar Monitoring Project in 1993 in five countries, therefore the wind resource data collected is site specific to these five countries and the sites selected. The annual average wind speed in Fiji at the 10-meter height was 5.8 m/s, 20-meter height was 6.1 m/s.

Nabouwalu Renewable Energy Hybrid Power System Nabouwalu is located at the south end of Vanua Levu, the second largest island in Fiji. Nabouwalu has good wind resources with an annual average wind speed of 6.2 m/s, and good solar radiation with an annual average of 4 sun peak hours per day. The renewable energy hybrid power system primarily consists of 8 x 6.7 kW wind turbines, 37 kW PV modules, battery, and inverter/controller. The design value of the system is 720 kWh/day. The operational experience of the Nabouwalu system demonstrates the technical viability of such a system for rural electrification in Fiji.

Ongoing and Previous Assistance

UNDP/GEF: The ongoing Pacific Island Climate Change Program (PICCAP) is a UNDP/GEF regional climate change enabling activity. This US$2.4 million project involves ten Pacific countries including Fiji. The project is designed to strengthen the capabilities of the participating countries, to enable them to prepare their national communication to the UNFCCC. SOPAC is currently assisting SPREP to identify regional options.

Foreign Governments: The French government provided approximately F$1 million to install 170 household solar power lighting systems in the village of Naroi on the island of Moala in the Lau Group. The Naroi project is the largest solar project ever undertaken in Fiji. The European Union donated F$164,000 to install 70 household solar PV lighting systems in Namara Village in Kadavu in 1994. When PV was first introduced in Fiji, USAID provided more than 300 PV equipment for installations in government stations, schools, health centers, offices, and individual households at different time from 1983 to 1988. The British Aid provided funding to strengthen the capability of DOE to develop the skills and expertise of the staff and establish the structure, procedures, and capability to ensure the long-term sustainability of the DOE in 1994.

ADB: The ADB funded Institutional Strengthening Technical Assistance (TA) of the FEA commenced in November 1996. The TA covered review of financial and accounting procedures, system planning, tariff setting, manpower planning, etc.

Barriers to the widespread use of Renewable Hybrid Power Systems in Fiji. There are several reasons why renewable energy systems have not been widely adopted in Fiji. These barriers all stem from absence of an effective RE policy or guidelines, and the need for a review of the existing policy. **Present efforts, however, are insufficient to influence the majority of Fiji villagers or government decision-makers.**

- *Barrier No. 1 Lack of sustainable institutional framework to run on a commercial basis and provide reliable service to the renewable energy hybrid systems.* As mentioned earlier, the PWD currently operates the Nabouwalu system and is paid by the central government to cover all their costs, and the fee collected goes back to the government. The consumers are charged at the FEA grid electricity price. Thus, the current institutional framework does not provide any incentive for PWD to cut the operational costs and run on a commercial and sustainable basis.
- *Barrier No. 2 Lack of the right electricity pricing to reflect the full the economic costs*. The current FEA charge is substantially lower than the full operation and maintenance costs, plus capital recovery charge.
- *Barrier No. 3 Lack of financing for rural electrification*. The government only allocated F$1 million per year for rural electrification. This level of funding is insignificant as compared to the number of applications for already received. In addition, the new created REU does not have any staff to implement the revised RE Policy and disseminate information on renewable energy.
- *Barrier No. 4 Lack of revenue collection technology*. Monthly fee collection can create local disputes. In the local communities, it is usually difficult to collect the full amount of fees from villagers or disconnect the users who do not pay their fees. As a result, current RE projects are not sustainable
- *Barrier No. 5 Lack of expertise of business management and marketing strategy.* Few government professionals are familiar with market finance, commercial enterprise operation and management, and economic project appraisal.

- *Barrier No. 6 Limited expertise to design, install, operate, and maintain the renewable energy hybrid systems.* Because Fiji has limited experience with renewable energy systems, particularly wind, there are few technicians familiar with the state-of-art renewable energy technologies, particularly installation and maintenance.
- *Barrier No. 7 Lack of information and awareness of the renewable energy systems and its potential among decision-makers and households.* Although the revised RE Policy designed three choices for the electrification schemes for the villagers to choose, the villagers are not well informed of the costs and benefits of each scheme. REU does not have enough staff to disseminate the information to promote renewable energy.
- *Barrier No. 8 Incomplete assessment of renewable resources*. The current understanding of the quantity and distribution of renewable resources and data analysis for renewable resource assessment is largely inadequate, particularly for data on wind regimes and solar radiation. This limited information poses a serious constraint to future investment in renewable energy technologies.
- *Barrier No. 9 Institutional constraints*. The involvement of the private contractors in rural electrification is constrained by PWD holding on to stand alone schemes.

Due to the above barriers, without this project, it is likely that the government will maintain the diesel schemes in the government stations, and the operation of the government stations will continue to be inefficient and uneconomical. In addition, more diesel generators will be installed to provide rural electricity services for the 900 unelectrified villages. Renewable energy, particularly solar and wind, will continue to play an insignificant role in rural electrification in Fiji.

Without GEF support, a great opportunity to introduce commercial Rural Energy Service Company at this critical juncture. Experience from other countries with similar technology shows that government owned, installed, and maintained renewable energy systems, like the Nabouwalu government station system, usually have unacceptably high maintenance costs. On the other hand, the individual household solar PV systems, which are owned and installed by the government and maintained by users, like the rural village electrification schemes in Fiji, usually have poor performance, or have failed.

EXPECTED PROJECT OUTCOMES, WITH UNDERLYING ASSUMPTIONS AND CONTEXT

The proposed project would be considered successful if a Rural Energy Service Company, which charges a fee for the electricity it produces, is established in Nabouwalu as a sustainable institutional framework. This would be replicated to the other Pacific Island Countries and parts of Fiji after the GEF project is completed.

On the basis of several institutional models tested in the Pacific Island Countries regarding rural electrification through renewable energy systems, it appears that the institutional approach that is most likely to succeed is the "provision of a fee-for-service utility company, rather than through the sale of hardware. Such an approach would require that the utility retains ownership and maintains the small-scale systems installed at the customers' premises. Trained staff would visit the customers regularly to maintain the systems, carry out repairs as needed and collect the service fee. The aim of the service fee would be to recover the utility's operating costs including a capital recovery charge. A central office would manage the accounts, the inventory of spares, training and procurement". This project aims to set up and strengthen Rural Energy Service Company to efficiently undertake the functions of a utility company.

The project will have global environmental benefits by reducing greenhouse gas (CO_2) and other emissions from diesel generators, and reducing oil usage for rural electrification.

Specifically, the expected project outcomes would be as following:

1. An effective institutional and management policy framework is in place, supported by the Government.
1. *A commercial and sustainable Rural Energy Service Company set up to run the Nabouwalu system.*
    - The ESCO will be able to charge and collect a fee to recover their full economic costs, including the capital recovery charge, and will retain the ownership of the Nabouwalu system. Thus, the ESCO can increase the operational efficiency and reduce the maintenance costs. The capital charge collected can be used to set up a Revolving Fund to facilitate future financing for replication in other parts of Fiji;

- The ESCO staff are capable of providing reliable installation and maintenance service to the community;
- The ESCO staff are capable of operating and managing the company on a commercial business basis;
- The ESCO also will be able to find financing sources, in addition to their Revolving Fund, to invest in renewable energy systems for replication in the other parts of Fiji.

2. *A sustainable legal and regulatory framework established for the Rural ESCO.*
   - A regulation Charter to establish the commercial Rural ESCO will be drafted. The drafted Charter will be submitted to the Cabinet for approval;
   - The Charter will define DOE's role as a technical regulator to oversight the technical quality of the procured renewable systems, and an independent economic regulator to oversight the fiscal accountability of the ESCO;
   - The Charter will also define the government's role to facilitate the ESCO to be able to access to affordable financing and help enable local communities to participate in PV dissemination.

3. *Increased information and awareness of renewable energy systems*. Public demand for the renewable energy systems will be increased. This will be a result of the project's awareness and information campaigns through REU. The local villagers will have raised information and awareness of renewable energy and its benefits for electrification, key government decision-makers are exposed to the success of the ESCO operation of the renewable energy systems for rural electrification.

4. *Improved assessment of renewable energy resources.* Solar radiation maps and adequate solar/wind resource information will become available. DOE staff will be capable of accomplishing data analysis, site selection, and feasibility studies. This will provide an information foundation for future investment in renewable energy technologies after the project is completed.

ACTIVITIES AND FINANCIAL INPUTS NEEDED TO ENABLE CHANGES

This project is specifically designed to remove the institutional, financial, informational, economic, and policy barriers to the commercialisation of renewable energy systems in Fiji. To achieve this objective, this project consists of eight activities. Each activity is briefly described below.

Activity No. 1 – Establish the Legal and Institutional Framework for the Rural Energy Service Company (Cost $120,000 from GEF)

This activity will assess the revised Electricity Act, Reorganisation Charter for FEA, the current RE policy (1993), other countries' experience and lessons with Rural ESCO, and current procedure for private investment. Then, this activity will draft a regulation Charter to facilitate the establishment of the Rural Energy Service Company. The Charter will address a) asset evaluation, ownership and liability transfer or equipment lease; b) land acquisition; c) issue of licenses; d) management autonomy and authority, and local involvement in the proposed ESCO; e) investment application procedure, and competitive bidding procedure; f) import duties, and other taxes. In addition, the Charter will define the role of DOE as a technical regulator by setting up quality and safety standards, establishing technical specifications, and conducting equipment testing to ensure the quality of the procured systems. The Charter will also define the role for an independent economic regulator to approve the electricity price and oversight the fiscal accountability of the ESCO. The Charter will also outline DOE's role to provide information and technical assistance to the ESCO, the government's role to help enable local communities to participate in PV dissemination and facilitate a financing mechanism for RE projects. The drafted Charter will be disseminated among all stakeholders and policy-makers, and eventually submitted to the Cabinet for approval.

This is achieved by consultancy studies, international tours, and participatory workshops/seminars. This activity directly removes barrier No. 1.

Activity No. 2 – Establish the Financial Framework for the Rural Energy Service Company (Cost: $105,000 of which $100,000 from GEF)

This activity will define the financial and economic framework of the regulation Charter for the Rural ESCO. The first step is to help the Rural ESCO set up a transparent pricing framework subject to monitoring by the government. This will involve hiring an independent consultant to estimate the full economic costs of the renewable energy hybrid system in Nabouwalu, and then estimate the appropriate electricity pricing to include the company's operation and maintenance costs, fuel costs, and capital recovery charge. This will be followed by financial feasibility study of the proposed ESCO to ensure the commercial viability and sustainability. The commercial viability will include tariff study for renewable energy. Since the Nabouwalu renewable system was donated by the Government of Japan, the capital recovery charge that ESCO collects can be used to set up a Revolving Fund to facilitate future financing for replication in other parts of Fiji.

This activity will help define a method of payment from the government where the government wants the ESCO to meet social obligations for rural electrification. That is, if the appropriate electricity pricing is higher than the WTP, the government needs to pay for the differences to guarantee the company can recover their costs. The method of payment could be cost-sharing, subsidy on the tariff, fuel concession, tax holiday, etc. In addition to defining a method of payment, this activity will also address a) the electricity pricing policy; b) government assurance of reasonable profitability for the ESCO; and c) government financing policy and financial incentives policy for future investment in renewable energy systems. These results will be included in the regulation Charter.

On completion of the above analysis, workshop(s) and seminar(s) will be held to disseminate the study results among policy-makers.

This activity will also install prepayment meters in village households to ensure the ESCO can collect the full amount of fees to recover their operational costs without local disputes. For the prepayment meters to work, the villagers need to buy a card with cash in the local grocery store, and insert the card in the prepayment meter to connect to electricity.

This activity is crucial to ensure the financial viability and self-sustainability of the ESCO, and should assist in removing barriers No. 2 and 4.

Activity No. 3 – Develop Investment Plan for the Rural Energy Service Company (Cost $50,000 from GEF)

In addition to being self-sustaining, the ESCO also should be able to find additional financing sources for future replication in other parts of Fiji. This activity will identify the available financing sources for renewable energy from the government, banks, multilateral, bilateral, and private sector, hold seminars/workshops with potential investors, and compile a database of potential investors profiles for the ESCO. This activity will also identify the commercial risks linked with investment, and develop financial incentive policy to attract investment. This activity is intended to ensure future replication and sustainability of the Rural ESCO, and directly removes barrier No. 3.

Activity No. 4 – Training ESCO Staff and Managers in Business Management Skills (Cost $30,000 from GEF)

This activity will provide training for ESCO staff and managers in a) market finance; b) commercial enterprise operation and management, and business accounting; c) economic/financial project appraisal; d) preparation of tender documents; and e) marketing strategies, etc. This activity ensures the ESCO will run on a commercially viable basis and ensures the financial sustainability of the ESCO. This directly removes barriers No. 5.

Activity No. 5 – Technical Training of ESCO Staff in the Installation and Maintenance of the Renewable Hybrid Systems (Cost $85,000 from GEF)

In Nabouwalu, in conjunction with the existing renewable energy hybrid power system, the staff of the proposed ESCO will be trained in how to install, operate, and maintain the renewable energy hybrid system. They will also be trained to be trainers in this domain.

This will create skilled ESCO staff capable : a) to install and maintain renewable solar and/or wind energy systems; b) to provide reliable service to the customers; c) to provide training to other workers as well provide technical back-up. This activity will directly remove barrier No. 6.

Activity No. 6 – Establish a Public Awareness Program in REU to Disseminate Information on Renewable Energy. (Cost $100,000 from GEF)

Rural Electrification Unit (REU) within DOE has the responsibility for implementing Rural Electrification Policy. This activity will help strengthen capacity within REU, hire consultants or work with an appropriate institution to conduct a public awareness program to disseminate information on renewable energy for rural electrification.

The public awareness programme will be implemented to ensure that a wide range of concerned stakeholders are fully informed about the technology, its benefits, potential, impacts, and availability. These awareness programmes will be tailored to target the following: villagers, school teachers, NGOs, government decision-makers, public-service workers, and potential investors. The young population will be a key target group. Where appropriate, the awareness programmes will use the renewable energy examples and the Nabouwalu system as demonstrations for awareness raising campaign. It is envisaged that this programme will consist of campaigns through posters, newsheets, radio broadcasts etc. This activity directly removes barrier No. 7.

Activity No. 7 – Capacity Building for DOE on Renewable Resource Assessment (Cost: $175,000, of which $120,000 from GEF)

Effective site selection first involves evaluation of existing resource data in a way that allows for the screening and selection of candidate sites. These sites will then undergo further on-site monitoring and evaluation. Currently, little analysis of existing wind and solar resource data has been carried out, and solar radiation patterns have not been mapped out. The availability of renewable resource data is a prerequisite to the future replication of investment in renewable energy systems in other parts of Fiji.

This activity will seek both to provide targeted training for DOE staff in renewable resource assessment techniques and to strengthen the process of establishing a database of renewable energy resources for one or two government stations to facilitate future replication. With regard to the former activity, a number of DOE staff will be trained in resource mapping, data processing and analysis, site selection, and feasibility study. This activity will also review and summarise the previous assessments of the renewable energy resource data in Fiji. In conjunction with training, this activity will undertake wind speed and solar radiation monitoring in one or two government stations. The purpose is a) to provide a strong information foundation of renewable energy resources data for future investment in other government stations in Fiji to remove the information barrier, and b) to provide on-the-job training for DOE staff in acquisition and analysis of the renewable energy resource data to remove the expertise barrier. This activity is crucial to facilitate future replication, and directly remove barrier No. 8.

Activity No. 8 – Training DOE staff in Equipment Testing and Technical Specifications (Cost $40,000 of which $30,000 from GEF)

The successful widespread commercial diffusion of renewable energy equipment will require technical specifications for technical performance and safety, the development and use of standards for product testing, evaluation, and certification, and commercial codes of practice. Technical specifications are required for such equipment as wind turbines, inverters, PV panels, battery charge controllers, and for batteries used in specific applications. Standards for testing and evaluation the performance and quality of individual components, subsystems, and systems will also be required as part of the commercialisation process.

After the Rural ESCO is established, DOE will play a role as an independent technical regulator to set up quality and safety standards, develop technical specifications, and conduct equipment testing to ensure the quality of the procured systems. This activity will provide training for DOE staff in equipment testing, preparation of technical specifications and standards. This activity is crucial to ensure that reliable high-quality products can succeed in marketplace, and build consumer confidence in the technology.

SUSTAINABILITY ANALYSIS AND RISK ASSESSMENT

Sustainability

From a technical standpoint, Nabouwalu renewable energy system has already demonstrated the technical viability of the technology. This project will develop in-country technical capacity to install and maintain the renewable energy systems. The project will strengthen DOE's capacity in preparation of technical specifications and standards as well as equipment testing to monitor the technical performance of the Rural ESCO. The project will also help create a sustainable demand for solar/wind energy through the public awareness program. These efforts should ensure the long-term sustainability of solar/wind energy technology in Fiji.

From a financial standpoint, the project will ensure that Rural ESCOs can charge and collect a fee to recover full operational and maintenance costs, and include a capital recovery charge. This project will also help develop investment plans to facilitate future financing for replication in other parts of Fiji. Sufficient training in business management will also be provided. All these efforts will ensure the financial sustainability and viability of the ESCO after the project is done.

From an institutional standpoint, this project will draft a regulation Charter to ensure the institutional sustainability of ESCO. The project will also build capacity for DOE to disseminate information on renewable energy and conduct renewable resource assessment to guarantee institutional sustainability after the project is done.

Risks

The project has the following associated risks. These are discussed along with the method to mitigate the risks:

1. Financial Viability of the ESCO. Because most renewable energy technologies still have higher upfront capital investment costs than the conventional energy sources, and rural electrification has traditionally been regarded as a social obligation rather than commercial operation, the Rural ESCO may not be self-sustaining, and may not be able to replicate its operation in other parts of Fiji. This project is designed to establish the financial framework to ensure the Rural ESCO can charge and collect a fee to recover its full operational and maintenance costs, and include capital recovery charge. Sufficient training in business management will be provided. This project will also help develop an investment plan to facilitate future financing for replication in other parts of Fiji.

2. Another financial risk would be if consumers' willingness to pay (WTP) is lower than the full economic cost. On the basis of findings if the tariff study covering an analysis of willingness to pay, this project will define a method of payment from the government where the government will pay for the differences to guarantee the company recovers its costs, in case such a situation occurs. All these project activities will ensure the financial sustainability and viability of the ESCO after the project is done. Therefore, this risk is considered moderate.
   Land Acquisition. In Fiji, about 83% of the total land area is owned by Fijians in communal tenure. Any development project, particularly energy projects, on native land has to negotiate with NLTB for land acquisition. Improper handling of land acquisition could develop into serious political controversy. For Nabouwalu and other government stations, the Lands Department has already signed a 30-year land lease with the local landowners through NLTB. When the private company comes in to take over the government stations, the Lands Department will transfer the land lease to the company. In addition, NLTB is under restructuring to increase operating efficiency. The current semi-annual payment to the landowners, for example, is expected to change to monthly or quarterly payment directly into landowners' bank account, and NLTB is intended to improve transparency to the landowners. Therefore, this risk is considered small.

STAKEHOLDER INVOLVEMENT AND SOCIAL ASSESSMENT

Stakeholder involvement

The project stakeholders include DOE, PWD, PICHTR, Ministry of Lands, NLTB, local landowners, SOPAC, SPREP, Fiji Trade & Investment Board (FTIB), villagers, local provincial officers, potential private/commercial

companies, potential investors, and national government. A strong stakeholder involvement is essential to the success of this project. The approach to this is described in detail in Section F, "Public Involvement Plan".

Social Assessment

The project will have significant positive social implications. The renewable energy technology being promoted will greatly reduce Fiji's oil imports, mitigate the health and environmental hazards posed by the petroleum products, and utilize indigenous energy resources to provide energy services to people in remote villages. Thus, this project can improve the livelihoods and living conditions of people in rural communities throughout Fiji.

D PROJECT IMPLEMENTATION PLAN

Institutional Arrangement

DOE will play a critical role in coordinating with several Ministries/Departments of Fiji (PWD), the Department of Environment under the Ministry of Local Government, Housing, and Environment, the Ministry of Lands; (FTIB), NLTB, local landowners, villagers in local communities, and international and national NGOs including PICHTR, and regional organisations such as SOPAC and SPREP..

The project will last for 2 years (24 months)

Activity	Quarter							
	1	2	3	4	5	6	7	8
Establish the legal and regulatory framework for the Rural ESCO	xx	X x						
Establish the financial framework for the Rural ESCO		X x	xx					
Develop investment framework for the Rural ESCO				xx				
Training in business management						x		
Training in installation and maintenance						xx		
Establish a public awareness program in REU				x	x	x	x	x
Capacity building for DOE on renewable resource assessment					xx			
Capacity building for DOE on technical specifications						xx		

E PUBLIC INVOLVEMENT PLAN

Stakeholder identification

The project is to be implemented by the Department of Energy within the Ministry of Communication, Works, and Energy in Fiji. The project stakeholders and their specific roles are described below:

- PWD: who installed and currently operate the Nabouwalu renewable energy system. They are also responsible for operation and maintenance of other government stations, and construction of village rural electrification schemes;
- Ministry of Lands: who handles the land acquisition;
- NLTB: whom the landowners have entrusted the management of their land;
- Local landowners: who own the land where the renewable energy system is located;
- Villagers: who are the consumers to receive the electricity service;
  Local provincial officers: who act as a bridge between DOE and local villagers. They are responsible for implementing rural electrification policy at local level, such as disseminating information and submitting requests from villagers to DOE;
- Potential investors: who may invest in the technology in the future, thereby providing capital financing;

- Potential private/commercial companies: who will become the candidates of the Rural Energy Service Company to participate in the competitive bidding;
- The national government: who will promote renewable energy technology and allocate resources to it.
- PICHTR: who designed the Nabouwalu renewable energy hybrid system;
- FTIB: who provides information and advice regarding local and foreign investment policies and process applications for approval of investment projects, concessions, and incentive schemes.
- SOPAC (South Pacific Applied Geoscience Commission); a regional organisation that has experience in renewable energy, energy training, energy policy development and the coordination of projects with regional benefits in the South Pacific region.
- SPREP (South Pacific Regional Environment Programme): a regional organisation that is currently executing the PICCAP project.

Information dissemination and consultation

As one of the barriers to renewable energy is lack of information, one of the aims of the project is to disseminate information through public awareness campaigns.

The project involves a large number and broad cross-section of people, particularly through the public awareness campaigns. This provides the opportunity to consult fully with representatives of all stakeholders. In particular, more formal consultations will be held:

- with decision-makers;
- through participatory workshops/seminars with all stakeholders;
- through workshops with private sector investors.

Stakeholder participation

The barriers to renewable energy cannot be removed without a high degree of stakeholder participation from all stakeholders listed above. With stakeholder participation, renewable energy will receive wide recognition and support. The following project components ensure this participation:

- The project design incorporates the findings of previous and ongoing project supported by NGO and the Government of Japan;
- The wide-scale awareness campaign will ensure the outreach of the technology as well as the project;
- The participatory workshop with all stakeholders for the first activity ensures their needs, expectations, interests, potentials, and recommendations will be reflected in the mechanism of the proposed Rural Energy Service Company;
- The proposed regulation Charter for the Rural Energy Service Company will address local participation and involvement issues;
- The survey of consumers' willingness to pay ensures the electricity price will not be charged at a higher rate than consumers' affordability;
- The workshops with policy-makers to disseminate the study results for the first two activities ensure full consultation with the policy makers on the key issues listed in the drafted regulation Charter;
- The workshop with potential investors will ensure that the project outputs reflect their concerns.

Social and participation issues

The project will be beneficial to the poor. In particular the widespread application of renewable energy resulting from the project should have a positive impact on vulnerable groups, through the following mechanisms:

- babies and children will benefit from the convenient form of energy – electricity, and the reduced local air pollution from fossil fuels;
- sick and elderly people will benefit from the convenient form of energy – electricity, and the reduced local air pollution from fossil fuels;
- women will have to spend less time going to the market to buy kerosene and less time collecting wood.
- more productive community meetings will result from enhanced understanding of renewable energy benefits gleaned from public awareness campaigns.

F BUDGET

This budget only covers the incremental costs. All figures are in Thousands of US dollars.

Component	GEF	Other Sources	Total
Personnel	255	3	258
Subcontracts[1]	120	0	120
Training	210	65	275
Equipment	31	2	33
Travel	54	0	54
Evaluation mission	20	0	20
Miscellaneous	30	0	20
Project Support	20	0	20
Subtotal	**740**	**70**	**805**
PDF	15	0	0
Total (PDF + project costs)	**755**	**70**	**825**

1. Subcontracts will be given to a) conduct studies/surveys for consumers' affordability; b) conduct information dissemination campaign by REU; and c) hold participatory workshops/seminars.

G MONITORING AND EVALUATION PLAN

The project will be monitored and evaluated in line with UNDP rules and procedures. Annual Performance Reports will be prepared and discussed through with the project executing agency and the project staff. This discussion culminates in annual Tri-partite Review meetings, leading to specific recommendations to improve project impact and implementation. In addition, at least one formal evaluation will be held in the final six months of the project. $20,000 has been allocated to support this evaluation.

The project team will undertake continuous, self-monitoring. At the outset, detailed and measurable performance indicators for the overall project will be prepared by the project team in consultation with UNDP, DOE and other concerned stakeholders. These performance indicators will be assessed each six months.

Based on the overall project objectives and these performance indicators, quarterly workplans will be prepared. These will indicate how the quarter's activities contribute to the overall objectives. Performance indicators will then be prepared for each quarter. This will be used to measure performance. In addition, this monitoring will be used to continuously refine the project approach and activities.

ANNEX INCREMENTAL COSTS ASSESSMENT

Introduction

The proposed project is complementary to local and national initiatives. Recently DOE and PWD installed a renewable energy hybrid power system in Nabouwalu government station, donated by the Government of Japan through PICHTR. This project seeks to establish a renewable-energy-based commercial Rural Energy Service Company that charges a fee for the electricity supplied to the consumers as a sustainable institutional framework in Nabouwalu, for replication in other parts of Fiji. A series of activities will remove institutional, financial, informational, economic and policy barriers to the commercialisation of renewable energy systems for rural electrification in Fiji. These activities are additional as no corresponding activity would occur under the baseline.

Baseline

The baseline consists of what the Government would do without GEF support. The government would likely maintain the diesel schemes in the government stations, and the operation of the government stations will continue to be inefficient and uneconomical. In addition, more diesel generators would be installed to provide rural electricity services for the 900 villages that currently do not have access to electricity. These diesel generators would emit more than 16,000 tons of CO_2 per year. Renewable energy, particularly solar and wind, will continue to play an insignificant role in rural electrification in Fiji.

The purchase of petroleum products from overseas would continue to be a major drain on Fiji's foreign reserves. The use of petroleum products will continue to pose health and environmental hazards to local community. The private sector involvement in rural electrification would lack potential and incentives to effect change.

Global Environment Objective

The GEF project will support activities that remove barriers to renewable energy systems in Fiji. Hence, renewable energy will become commercialized, and consequently play a larger role in rural electrification as a result of the replication made possible by this project. The Nabouwalu system demonstrated that the renewable energy hybrid power system can reduce diesel consumption by 80%. Thus, if all the government stations, and the 900 villages that currently do not have access to electricity, adopt renewable energy to provide electricity, at least 15,000 tons of diesel consumption will be cut, and annual CO_2 emissions will be reduced by at least 13,000 tons.

Furthermore, the project will contribute to making renewable energy systems commercially viable. This will establish Nabouwalu as a model and have a wide replication in Fiji and many other remote islands in other parts of the world to promote renewable energy power systems.

In addition to reduced diesel consumption, there would be less fuelwood, straw, and kerosene burned for household energy use, thus, CO_2 emissions would be cut. These are difficult to quantify, but are minor compared to the reduced CO_2 from diesel combustion.

Alternative

In the alternative GEF project, a commercial and sustainable Rural Energy Service Company would be set up to run the Nabouwalu system to improve the operating efficiency and reduce the maintenance costs. A sustainable legal, regulatory, and financial framework would be established to facilitate formation of the Rural ESCO. The public and policy-makers would have increased interest in renewable energy systems for rural electrification through the public awareness program. Improved renewable resource data would become available and DOE staff would have enhanced renewable resource assessment expertise. A series of complementary activities, as follows, will ensure that barriers are removed:

Activity No. 1 – Establish the Legal and Institutional Framework for the Rural Energy Service Company

This activity will draft a regulation Charter to establish the legal and institutional framework that can facilitate the establishment of the Rural ESCO. This activity will directly remove barrier No. 1. Without GEF support this activity would not take place and so all costs are incremental. Incremental costs associated with this activity total

$120,000 from GEF, which will cover the costs to hire an international consultant and two national consultants, conduct international study tours to learn experiences and lessons from other countries, and hold participatory workshops/seminars.

Activity No. 2 – Establish the Financial Framework for the Rural Energy Service Company
This activity is designed to ensure the financial viability and sustainability of the Rural ESCO, and will directly remove barrier No. 2 and 4. Without GEF support this activity would not take place. The total costs needed for this activity are estimated to be $105,000, which will cover the costs to hire one international/regional consultant (resource economist) and one national consultant, to give subcontract to an academic institution or regional technical organisation in Fiji to conduct the study/survey for consumers' affordability, to hold workshops/seminars, and to install prepayment meters for village households.

The installation of regular meters to the 56 village households in Nabouwalu is a baseline activity, so the cost associated with this component is baseline cost ($2,000). The installation of prepayment meters, instead of regular meters, is crucial to ensure the financial viability of the ESCO. This will enable the company to collect fees from village households to fully recover their costs without local disputes. The cost differences in prepayment meters and regular meters are incremental cost. Hence, the incremental cost of this activity is estimated to be $103,000, of which $100,000 from GEF. The government will pay $3,000 in-kind contribution towards personnel to assist the economic/financial studies.

Activity No. 3 – Develop Investment Plan for the Rural Energy Service Company
The activity is designed to ensure the future replication and sustainability of the Rural ESCO in other parts of Fiji, and directly removes barrier No. 3. Without GEF support, no such activity would take place, so all costs are incremental. The incremental costs associated with this activity are estimated at $50,000 from GEF, which will cover the costs to hire consultants and hold workshops with potential investors.

Activity No. 4 – Training ESCO Staff and Managers in Business Management Skills
This is a capacity-building activity to ensure the commercial management of the Rural ESCO to ensure the financial viability of the company. This activity directly removes barrier No. 5. Without GEF support, no such training would take place, so all the costs of this activity are incremental. Incremental costs associated with this activity total $30,000 from GEF.

Activity No. 5 – Technical Training ESCO Staff in the Installation and Maintenance of the Renewable Energy Hybrid Systems
This is also a capacity-building activity to ensure the Rural ESCO can provide reliable installation and maintenance service to the local community, and directly removes barrier No. 6. Without GEF support, no such training would take place and so all costs are incremental. Incremental costs associated with this activity total $85,000 from GEF, which will cover the intensive technical training in Nabouwalu.

Activity No. 6 – Establish a Public Awareness Program in REU to Disseminate Information on Renewable Energy
Public awareness programmes will be implemented to ensure that a wide range of concerned stakeholders are fully informed about renewable energy, its impacts, benefits, and availability. It is envisaged that these programmes will consist of posters, newsheets, radio broadcasts etc. This activity will directly remove barrier No. 7. Without GEF support, no related activity would take place and so all costs are incremental. Incremental costs associated with this activity total $100,000 from GEF, which will cover the costs to add three new staff in REU responsible for dissemination of information on renewable energy for rural electrification, and to subcontract REU to conduct the public awareness program.

Activity No. 7 – Capacity Building for DOE on Renewable Energy Assessment
This activity will provide on-the-job training for DOE staff in renewable resource assessment techniques, and monitor wind and solar resource data at one or two government stations to provide on-the-job training and a solid information foundation for future investment in other parts of Fiji. This activity is crucial to facilitate future replication, and will directly remove barrier No. 8.

Without GEF support, no related activity would take place. Then a lack of renewable resource data and assessment techniques would make future replication extremely difficult. So all costs are incremental. Incremental costs associated with this activity total $175,000, of which GEF will cover $120,000. DOE will cover $30,000 for personnel towards the training component and $25,000 towards the renewable resource monitoring component.

Activity No. 8 – Training DOE Staff in Equipment Testing and Technical Specifications

This activity will build the capacity for DOE to act as an independent technical regulator to ensure the quality of the procured renewable systems. This is crucial to ensure that reliable high-quality products can succeed in marketplace, and build consumer confidence in the technology. Without GEF support, no related activity would take place and so all costs are incremental. Incremental costs associated with this activity total $40,000, of which GEF will cover $30,000. DOE will cover $10,000 in-kind contribution towards their personnel.

Incremental Costs Matrix

	Baseline	Alternative	Increment (Alternative - Baseline)
Global environmental benefits	The four government stations that currently operate diesel generators and the 900 villages that will be equipped with diesel generators lead to approx. 16,460 tons of CO2 emitted per year from diesel combustion; Renewable energy for rural electrification remains insignificant.	The renewable energy hybrid systems can cut diesel consumption by 80%, thus, reduce 80% GHG emissions. Less CO2 would be emitted from wood, agricultural waste, as well as kerosene burning; Renewable energy power systems for rural electrification would become commercialized in Fiji.	13,170 tons of CO2 per year emitted from diesel combustion would be cut, and CO2 emissions from wood, agricultural waste as well as kerosene burning would be reduced; Large-scale commercialization of renewable energy systems for rural electrification would be achieved in Fiji; The successful legal and institutional framework for Rural ESCO can facilitate future replication of renewable energy in Fiji.
Domestic benefits	The import of petroleum products continues to be a major drain on Fiji's foreign exchange reserves; The inefficient use of petroleum products poses local health and environmental hazards; The operation of the renewable energy system in Nabouwalu remains inefficient and uneconomical.	Diesel consumption would be reduced by 80%, so the government expenditure on import of petroleum products would be saved; The local health and environmental impacts would be improved; The government expenditure on Nabouwalu system can be cut, the system operation would become efficient; Increased interest in renewable energy for rural electrification in Fiji; Improved renewable energy resource data would become available.	4,560,000 gallons (15,400 tons) of diesel consumption can be reduced, and US$9,120,000 can be saved from diesel import; The local health and environmental impacts would be improved; The government expenditure on Nabouwalu system can be cut, the system operation would become efficient; The successful experience of the Rural ESCO in Nabouwalu would provide a model for future private sector involvement in rural electrification in Fiji.

Activity	Baseline Costs	Alternative Costs	Incremental Costs
1. Establish the legal and institutional framework for the Rural ESCO	0	$120,000	$120,000 GEF
2. Establish the financial framework for the Rural ESCO	3,000	$100,000	$103,000: $100,000 from GEF $3,000 from DOE
3. Develop investment plan for the Rural ESCO	0	$50,000	$50,000 GEF
4. Training ESCO staff and managers in business management skills	0	$30,000	$30,000 GEF
5. Training ESCO staff in installation and maintenance of the renewable system	0	$85,000	$85,000 GEF
6. Establish a public awareness program in REU to disseminate information on renewable energy	0	$100,000	$100,000 GEF
7. Capacity building for DOE on renewable resource assessment	0	$175,000	$175,000: $120,000 from GEF $55,000 from DOE

8. Training DOE staff in equipment testing and technical specifications	0	$40,000	$40,000: $30,000 from GEF $10,000 from DOE
TOTAL	2,000	$705,000	$703,000: $635,000 GEF, $68,000 DOE (in-kind)

Fiji Renewable Energy Hybrid Power Systems – Project Planning Matrix

Summary	Objectively Verifiable Indicators	Means/Sources of Verification	Important Assumptions
Development Goal The project is aimed to reduce CO_2 emissions through setting up a sustainable institutional framework to accelerate commercial utilization of renewable energy hybrid systems to substitute for current use of diesel generators in Nabouwalu, for replication in other parts of Fiji.	1. Decreased diesel consumption for rural electrification; 2. Increased annual installed capacity of renewable energy power systems for rural electrification; 3. Increased share of rural electrification by renewable energy; 4. Increased number of villages choosing to install renewable power systems	1. Data of diesel consumption for rural electrification from surveys and calculations 2. Data on annual installed capacity and share of renewable energy systems for rural electrification from surveys 3. Number of village applications of renewable energy power systems for rural electrification program submitted to Rural Electrification Unit (REU) at FDOE	1. Reliable data from surveys and reports 2. Applications for renewable energy power systems are submitted to REU
Project Purpose 1. To promote renewable energy power systems for rural electrification to replace diesel; 2. Efficient and commercial operation of renewable energy systems for rural electrification; 3. To promote private sector involvement in rural electrification 4. To accelerate rural electrification program with renewable and indigenous energy sources 5. To reduce imports of petroleum products 6. To reduce local health and environmental impacts from diesel consumption	1. Increased share of rural electrification by renewable energy 2. Increased number of villages choosing to install renewable power systems 3. Decreased diesel consumption and import for rural electrification; 4. Commercial Rural Energy Service Company (ESCO) set up to run the renewable energy power systems efficiently 5. Increased number of villages with access to electricity service by renewable energy each year	1. Data on annual installed capacity and share of renewable energy systems for rural electrification from surveys 2. Number of village applications of renewable energy power systems for rural electrification program submitted to REU at FDOE 3. Data of diesel consumption and import for rural electrification from surveys and calculations 4. Independent monitoring of technical and financial performance of the Rural ESCO 5. Number of villages with access to electricity by renewable energy through surveys	1. Reliable data from surveys and reports 2. Applications for renewable energy power systems are submitted to REU 3. An independent technical and fiscal regulator set up to oversight the Rural ESCO

Outputs 1. A commercial and sustainable Rural Energy Service Company (ESCO) set up to run renewable energy power systems 2. A sustainable legal, regulatory, and financial framework established for the Rural Energy Service Company; 3. Increased information and awareness of renewable energy systems; 4. Improved assessment of renewable resources.	1. The Rural ESCO will run the renewable energy systems on a commercial basis, and provide reliable maintenance service; 2. A Regulation Charter for Rural ESCO is drafted; 3. Increased share of rural electrification by renewable energy 4. Increased number of villages choosing to install renewable power systems 5. Improved renewable resource data will become available.	1. Independent monitoring of technical and financial performance of the Rural ESCO 2. The Regulation Charter will be submitted to the Cabinet for approval 3. Data on annual installed capacity and share of renewable energy systems for rural electrification from surveys 4. Number of village applications of renewable energy power systems for rural electrification program submitted to REU at FDOE 5. Easy access to renewable energy database and maps by potential investors and project developers	1. An independent technical and fiscal regulator set up to oversight the Rural ESCO 2. The Rural ESCO will be able to charge and collect a fee to recover their full economic costs 3. The Regulation Charter will be approved by the Cabinet, and enforced. 4. Reliable data from surveys and reports 5. Applications for renewable energy power systems submitted to REU 6. Improved renewable energy resource information will promote investment in renewable energy power systems 7. Easy and transparent process for land acquisition, and efficient operation of Native Land Trust Board (NLTB)

Activities			
1. Establish the legal and institutional framework for the Rural energy service company (ESCO)	1. A Regulation Charter for Rural Energy Service Company is drafted;	1. The Regulation Charter will be submitted to the Cabinet for approval	1. The Regulation Charter will be approved by the Cabinet, and enforced.
2. Establish the financial framework for the Rural ESCO	2. The ESCO can charge and collect a fee to recover its full economic costs;	2. Independent financial monitoring of the fiscal performance of the Rural ESCO	2. An independent fiscal and technical regulator set up to oversight the Rural ESCO
3. Develop investment plan for the Rural ESCO	3. Information on potential investors and investment opportunities is available;	3. Financial self-sustaining of the Rural ESCO	3. Consumers' willingness to pay is high enough to cover the full economic costs of ESCO, otherwise the government would provide payment to cover the losses of ESCO
4. Training ESCO staff and managers in business management skills	4. Commercial management of the rural ESCO;	4. Easy access to financing sources and potential investors profiles	4. Sources of capital will become available
5. Training ESCO staff in installation and maintenance of the renewable system	5. Reliable maintenance service provided;	5. Financial incentive policies to attract investment in renewable energy power systems established	5. The ESCO would hire local staff who need technical and business training
6. Establish a public awareness program in Rural Electrification Unit (REU) to disseminate information on renewable energy	6. Increased pubic interests in renewable energy systems;	6. Independent technical monitoring and public surveys of the reliability of the services provided by the Rural ESCO	6. trained staff will remain in position
7. Capacity building for DOE on renewable resource assessment	7. Improved renewable energy resource data are available;	7. Number of village applications of renewable energy power systems for rural electrification program submitted to REU at FDOE	7. Reliable data from surveys and reports
8. Training DOE staff in equipment testing and technical specifications	8. All renewable energy systems are met with quality assurance.	8. Data on annual installed capacity and share of renewable energy systems for rural electrification from surveys	8. Applications for renewable energy power systems submitted to REU
		9. Easy access to renewable energy database and maps by potential investors and project developers	9. Improved renewable energy resource information will promote investment in renewable energy power systems
		10. Increased consumer confidence of renewable energy power systems for rural electrification through consumer surveys	10. Codes and standards for quality assurance will be followed
			11. Easy and transparent process for land acquisition, and efficient operation of Native Land Trust Board (NLTB)

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17th November 1998

The Resident Representative
United Nations Development Programme
Private Mail Bag
SUVA.

Attention : Dr Jenny Bryant Tokalau

Dear Sir

Attached is the final version of the GEF project proposal titled "Fiji Renewable Energy Hybrid Power Systems". The project was prepared after discussion at the workshop, consultations with your organisation and Pacific International Centre for High Technology Research.

As the GEF Focal Point in Fiji, we fully endorse the proposal and look forward to your consideration and response in due course.

Yours faithfully

B. Nair
Deputy Secretary
for **Permanent Secretary for Local Government, Housing and Environment**