

United Nations Development Programme
Country: FIJI
PROJECT DOCUMENT



Project Title: **Fiji Renewable Energy Power Project (FREPP)**

UNDAF Outcome(s): The mainstreaming of environmental sustainability and sustainable energy into regional and national policies, planning frameworks and programmes; and Pacific communities sustainably using their environment, natural resources and cultural heritage.

UNDP Strategic Plan Environment and Sustainable Development Primary Outcome: National capacity is strengthened to manage the environment in a sustainable manner while ensuring adequate protection of the poor.

UNDP Strategic Plan Secondary Outcome: Coherence in global development aimed at real improvements in people's lives and in the choices and opportunities open to them strengthened through policy advice, technical support, advocacy and contributions.

Expected CP Outcome(s): Environmental sustainability and sustainable energy are mainstreamed into regional and national policies, planning frameworks, and programmes; and Fiji communities effectively manage and sustainably use their environment, as well as natural and cultural resources

Expected CPAP Output (s): Policy, legislative and management frameworks developed and strengthened capacity at all levels improves implementation of environment programmes, conservation, sustainable use and equitable sharing of benefits from natural resources, including biodiversity, fisheries (marine and freshwater), and the promotion of sustainable renewable energy.

Executing Entity/Implementing Partner: Fiji Department of Energy

Implementing Entity/Responsible Partners: United Nations Development Programme

Brief Description

This Fiji Renewable Energy Power Project (FREPP) focuses on the removal of barriers (policy, regulatory, market, finance, and technical) to the wide-scale use of RE resources for grid-connected power generation in Fiji. It is in line with the GEF-4 Strategic Program 3 on promoting market approaches for the supply of renewable electricity in utility scale grid-based power systems; and Strategic Program 4, on promoting sustainable energy production from biomass and modern uses of biomass. The proposed project consists of 4 main components, each addressing specific categories of barriers, and these are: (1) Energy Policy & Regulatory Frameworks; (2) RE Resource Assessments and RE-based Project Assessments; (3) RE-based Power Generation Demonstrations; and, (4) RE Institutional Strengthening. FREPP is expected to facilitate investments in RE-based power generation in Fiji, which will not only support the socio-economic development of the country, make use of the country's RE resources and reduced GHG emissions.

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Management Arrangements:	NIM
PAC Meeting Date:	22 nd July 2010

Total resources required:	US\$17,528,673
Total allocated resources:	
• Regular:	
• Other:	
○ GEF	US\$975,000
○ Government	US\$1,553,673
○ Vara RE	US\$15,000,000

Agreed by (Ministry of Finance & National Planning):

Date/Month/Year

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List of Acronyms

ADB	Asian Development Bank
CO ₂	Carbon Dioxide
DSC	Development Sub Committee
EOP	End-of-Project
FDOE	Fiji Department of Energy
FEA	Fiji Electricity Authority
FNU	Fiji National University
FREPP	Fiji Renewable Energy Power Project
FTIB	Fiji Trade & Investment Board
GEF	Global Environmental Facility
GHG	Greenhouse Gases
IEP	Integrated Energy Planning
IPP	Independent Power Producer
JICA	Japan International Cooperation Agency
kV; kVA	Kilovolt; Kilovolt-Ampere
kton	Kiloton (1,000 tons)
kW; kWh	Kilowatt; Kilowatt-hour
MDG	Millennium Development Goals
MPU	Ministry of Public Utilities
MRD	Mineral Resources Department
MW; MWh	Megawatt; Megawatt-hour
NEMP	National Electrification Master Plan
NEP	National Energy Policy
NIM	National Implementation Modality
OPVI	Oil Price Vulnerability Index
PCDF	Partners in Community Development Fiji
PIC	Pacific Island Country
PIGGAREP	Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project
PIREP	Pacific Island Renewable Energy Project
PPA	Purchasing Power Agreement
PWD	Public Works Department
PV	Photovoltaic
RE	Renewable Energy
RESCO	Renewable Energy Service Company
RET	Renewable Energy Technology
SEFP	Sustainable Energy Financing Project
SHS	Solar Home System
SIDS	Small Island Developing States
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of the South Pacific
WB	World Bank

1. SITUATION ANALYSIS

Context and Global Significance: Environmental and Policy

1. Fiji faces common challenges resulting from its small size, geographic isolation and natural disaster vulnerability. Fiji is part of Small Island Developing States (SIDS) and committed to the Mauritius Strategy, a blueprint to address national and regional sustainable development in SIDS that takes into account the economic, social and environmental aspects that are the pillars of the holistic and integrated approach to sustainable development¹. Fiji's "Roadmap for Democracy and Sustainable Development 2009 - 2014" is also increasingly being aligned with the MDGs. However, ensuring inclusive growth and globalization is particularly challenging in Fiji.
2. Despite a moderate acceleration of economic growth in recent years, this has not translated into significant improvements in per capita income and human development. Previous political instability and inadequate investment had led to the deterioration in quality of life, while increasing hardship and poverty significantly, with new pockets of poverty emerging in urban squatter settlements and in rural areas. Despite this, different governments have always worked hard in trying to alleviate poverty in Fiji. With the recent government, the establishment of the People's Charter, has, as one of its Key Pillars – the reduction of poverty to a negligible level by 2015. The significant net aid inflows to Fiji have yet to be fully integrated in national planning and budgeting processes.

Threats, Root Causes

3. Due to the heavy reliance on primary commodity production and exports, particularly sugar, marine-based resources and tourism, community-based management of natural resources and maintenance of the environment are essential for growth and improved livelihoods. Competing demands on the environment and impacts of climate change, waste management and poor natural resource management pose significant challenges to Fiji. Contributing factors include: limited integration and non-implementation of environment in national or sectoral plans and strategies, limited documentation of traditional practices, and inadequate capacities of communities to practice responsible and equitable harvesting of natural resources. Concerns about improving equitable access to natural resources, including renewable energy (RE), waste management and climate change adaptation to enable opportunities for sustainable livelihood options require special consideration under the current situation.
4. Increasingly, environmental policy is being mainstreamed into national and regional agreements and frameworks. Fiji continues to be highly dependent on imported petroleum products for power generation, transportation, industrial and household uses. Recently UNDP has studied the impact of rising oil prices on developing countries of the Asia-Pacific region. An Oil Price Vulnerability Index (OPVI) has been constructed to measure the vulnerability of countries to increasing oil prices. Out of 24 Asia-Pacific countries studied, 13 countries are classified as 'most vulnerable', and four PICs including Fiji are among the seven most vulnerable countries'. For the last three years, annual imports of petroleum products have been hovering around the one billion Fiji Dollar mark, e.g. in 2008 the total value of fuel imports was about FJ\$1.3 billion or 37% of the value of total imports². For a small economy

¹ http://www.un.org/smallislands2005/pdf/sids_strategy.pdf

² Bulk of the fossil fuel consumption of Fiji is used for transport. Oil-based power generation accounts for approximately 35% of the power generation mix in the country.

like Fiji, the effects of such expenditures can be devastating and also means reduced budgets for critical social concerns such as education and health.

Long-Term Solution and Barriers to Achieving the Solution

5. In 2006, the Government of Fiji Cabinet endorsed its first ever National Energy Policy (NEP) that seeks to address the major constraints of country's energy sector in ensuring the sustainable supply of electricity to support social and economic development. Among the key constraints and associated proposed solutions are the following:
6. Absence of an integrated energy plan that is in-line with a strong and consistent national energy policy – An integrated energy plan that is not susceptible to changes in government administration is lacking in the country. Such situation creates an environment of uncertainty for energy consumers, as well as public and private sector investors. Along with the absence of an integrated energy plan is the uncertain medium and long-term investment environment in the country. An additional barrier to the development and utilization of the country's renewable energy resources and the development of large scale renewable energy programs is the lack of comprehensive energy legislation and regulations. Clear and consistent energy policies including the enactment and enforcement of an Energy Act³ (including the associated implementing rules and regulations) would encourage increased use of, and investment in, RE-based power generation in the country.
7. Alternative indigenous energy resources are not being fully developed and utilized – According to the NEP while '...indigenous energy sources have the potential to meet our energy needs there are many barriers to the immediate transition of the energy mix to favor these sources'. Currently, bulk of the electricity generated in the major islands of the country is from hydro resources. It once reached 85% in 1999 but had since been declining as a result of the increasing demand and to an extent, limited rainfall within water catchment areas. Current developments in this area have been more reactive rather than planned. The monitoring of the extent of the hydro resource is demand-driven and only undertaken when a prospective energy project developer is interested in developing a specific hydroelectricity power project. As to the utilization of the wind energy resource, at present, electricity production from wind accounts only for about 1% of the electricity mix. To ensure energy security, the contribution from wind, hydro and biomass resources should be increased. However there is insufficient knowledge about Fiji's large-scale (and mini) hydroelectric resource, with little long-term monitoring in recent years and relatively poor knowledge about the geothermal, wind energy and biomass resource.
8. Additional issues – these include financial constraints, linked to the limited government funding for energy investments. Even private power developers have financing constraints, and they too are dependent on external financing for energy investment projects in the country. The limited capacity (manpower and technical) in the Fiji Department of Energy (FDOE), which is the Government's focal point for the energy sector including energy policy development and oversight of energy sector operations, needs to be addressed in order to realize the sustainable development and utilization of the country's RE resources, and the effective application of RE technologies for electricity and non-electricity purposes.

Stakeholder and Baseline Analyses

³ In 2004, the Renewable Energy Charter, which was developed and formulated under the UNDP-GEF project on "Promoting Promoting Sustainability of Renewable Energy Technologies and Rural Renewable Energy Service Companies in Fiji, was approved by the Cabinet. It was later planned to expand it into a Renewable Energy Bill.

Stakeholder analysis

9. During the formulation of the Fiji Renewable Energy Power Project (FREPP), potential stakeholders involved in energy sector development were identified and key ones consulted and their commitment to support the project were confirmed. The following list provides an overview of stakeholders that would contribute to the project as matched against their respective mandates and roles:
- Department of Energy (DOE) – This is the office under the Ministry of Works and Energy, which is overall in-charge of energy-related matters in Fiji. The DOE will serve as the implementing partner for the FREPP and its Director will serve as the Executive of the Project Board.
 - Department of Environment – *National GEF Operational Focal Point* – This is responsible for environmental matters including those that are climate change-based. The department is the designated National GEF Operational Focal Point, and will be involved in the monitoring of the project performance.
 - Fiji Electricity Authority (FEA) – This is a government-owned corporation responsible for the commercial production of electricity and the national grid transmission facilities with its current goal of having 90% electricity supply from RE by 2014. It is committed to put up RE installations building up from what the project will be able to facilitate for promoting the commercialization of RE-based power generation and best practices and experiences gained from the project.
 - Ministry of Finance – This is the government agency in charge of the usual funding and financial mechanisms in support of all projects of Fiji, including renewable energy. It also provides for incentives and other fiscal assistance to enhance project viability. Under this agency is the Budget and Planning Department, which is responsible for planning and budgeting of government projects. It will be involved in the more detailed characterization of project budgets and plans of the energy policy and plan at the national level, particularly for the strengthening of the DOE. This agency will be involved in endorsing and approval of the budget of the DOE.
 - Ministry of Public Enterprise – This is the government agency in charge of Government-owned companies, corporations and public enterprises. Government ministries and departments that need to be reformed into profit-oriented enterprises are reformed under the Public Enterprises Act controlled by the ministry. At the moment, the Fiji Electricity Authority is being reformed by the Ministry of Public Enterprise with the view to eventually privatising part of their operation.
 - Beneficiaries - customers of the project range from the Government, private companies and citizens.
 - Resource owners – in the context of the project resource owners are taken to mean owners of lands on which energy resources are located. While the term has generally been referred to indigenous landowners, definition of the term would also include private owners of land (freehold land owners) and the State over State land areas.
 - Independent Power Producer Investors – independent power producers are those entities approved by the Fiji Electricity Authority to produce and supply electricity to a power grid.
 - Commerce Commission – the Commission regulates the price of electricity supplied by the Fiji Electricity Authority via the grid.
 - Banks – These provide funds for investment projects on commercial terms.
 - Ministry of National Planning – coordinates all development activities through the Development Sub Committee (DSC) comprising all Permanent Secretaries or heads of government ministries. All major development projects of Government are scrutinised through the DSC before it goes up to Cabinet.

- Media – the media is important in that it disseminates information to the public. It is important though that the information disseminated to the media for public consumption is understandable, timely and factual.
- Development partners (including USP, SPC, UNDP) – development partners based in Fiji are important for the success of the project in that they provide technical expertise and other support services that are not available locally.
- Politicians – In Fiji’s present political environment, the only politicians are Ministers appointed by His Excellency the President. Most of the reform issues to be undertaken by the project will be taken up to the Cabinet which is chaired by the Prime Minister and comprise all Ministers as members.
- RE Hardware Suppliers – The RE hardware suppliers consist of companies and investors that will be engaged in the supply of hardware materials for the implementation of renewable energy projects.

Available Renewable Energy Resources in Fiji

10. An assessment undertaken in 2004 (PIREP Pacific Regional Energy Assessment – Vol. 4, Fiji National Report, SPREP) shows that Fiji has a wide range of renewable energy resources that have been tested, sustained and planned for by the Government together with development partners. These include: biomass, biofuel, biogas, ethanol, gasifiers, geothermal, hydro, solar, ocean and wind as summarised in Table 1 below.
11. Subsequent analysis shows that the most technically and economically feasible RE resources that can be further developed includes: biomass (and biofuels), hydro and solar. Using its core resources together with funding from development partners, the Government of Fiji has progressed with RE development through implementation of its “Rural Electrification Programme” to encourage wider use of solar PV systems. Additionally, Fiji has recently rolled out its “Biofuels Programme” with seed funding from UNDP including commissioning of a recent Biofuel Mill in Koro Island with plans to replicate this system to additional outer islands and remote locations in Fiji.

Planned RE Investments in Fiji

12. Fiji is currently planning and considering some RE investments that include the following:
 - Fiji is applying for funding under the PALM 5 Pacific Environment Community Fund (PEC Fund) Implementation for the installation of an additional 2000 SHS in remote areas around Fiji.
 - The DOE is currently involved in the Low Carbon Tourism Initiative by providing funding to the Tourism Sector for the implementation of renewable energy projects in hotels etc.
 - Two new IPPs have signed PPAs with the FEA with one focusing on waste-to-energy and the other on biomass-to-energy.
 - FEA is currently developing a hydro station at Nadarivatu on Viti Levu. The installed capacity of the hydro plant is 42MW.
 - The government is promoting the development of biofuel resources in Fiji. Recently, the opening of a pilot plant with private sector participation took place on Koro Island with plans to replicate this set-up in several other remote locations in Fiji.
13. However, certain barriers hinder the implementation of these planned RE investments as explained below. Issues include finances and regulatory aspects of IPPs. These are being targeted under FREPP.

Table 1: Past and Current Experiences of Available Renewable Energy Resources in Fiji

RE Resource	Summary of Estimated Potential (as of 2004)	Summary of Past Experiences (as of 2004)	Summary of Experiences (as of 2010)
Biomass	Provides ~50% of gross energy use in Fiji. Potential sources: 700kT of bagasse from sugar mills, 250kT for household cooking, <100kT for copra drying, ~100kT of municipal solid waste producing 5MW electricity.	Traditionally used for cooking and copra drying that were improved in 1980s through well-designed wood-stoves that led to its acceptance in schools. A robust, updated wood/coconut waste steam power system is still in operation since 1979 which was replicated to other communities but could not be sustained due to political crisis.	The use of biomass in schools has waned in some schools where the backup service is non-existent due to the winding up of the Kana Project which was administered by the NGO that was a precursor to the well-known Partners in Community Development Fiji (PCDF). Biomass is still widely used even in urban areas where other fuels are available. It is still used in copra-driers for household cooking and for electricity generation.
Biofuel	Coconut oil has been used as an alternative to diesel fuel to operate diesel generators. Potential is 15,000 lit/yr	80 kVA generator provided electricity for 198 households and a 45 kVA generator was used to electrify 60 households. A viable technology but difficulties with local management for operations and <i>in situ</i> production of oil.	The two initial trial projects using coconut oil in Diesel engines are not operating due to technical problems (system break-down) requiring expensive import of coconut oil from other islands. The newly commissioned mill in Koro Island produces 240,000 litres bio-diesel (annually) with annual generating potential of 283.1KWh.
Biogas	Biogas from urban sewage producing 1MW of electricity.	Tested at small piggeries and dairies for 30 years but unsuccessful since operating efforts exceeded energy gain. New designs emphasizing waste control are successful and to-date several pilot projects have been installed for domestic cooking purposes while digested material are used as fertilizer.	Several small-scale biogas digesters have been installed on pig farms and dairies through DoE. In 2003, PWD began building a locally financed biogas system at Suva's sewage treatment plant. Once complete, it will fuel a 250kW engine providing electricity for internal use. An ADB loan to extend sewerage coverage may include a 1MW biogas-fuelled generator.
Ethanol	10-15 ML/year of ethanol produced from sugar, molasses, and sorghum to blend with petrol.	Plans abandoned due to non-feasibility (i.e. economically and financially marginal).	A World Bank study has found that ethanol for the Fiji market can be sustainable if molasses from sugar is used as the main ingredient.
Solar	Solar radiation (lowest to highest long-term annual average): 3.7 - 5.1 kW/m ²	<u>Solar PV</u> : Rural electrification with a Renewable Energy Service Company (RESCO) management structure was first tested in two communities with a total of 80 PV systems. Expansion to other communities through lessons learned has been gradual ever since. <u>Solar Thermal</u> : this is commercially viable and has been locally manufactured since the 1970s with thousands of locally made and imported systems	Currently, the DOE has a total of 1450 SHS systems installed under the RESCO model and the number continues to grow annually. With respect to Solar Water Pumping, the DOE is currently working with the SPC and MRD on the installation of solar water pumps in rural areas.

RE Resource	Summary of Estimated Potential (as of 2004)	Summary of Past Experiences (as of 2004)	Summary of Experiences (as of 2010)
		<p>installed in homes and tourist facilities.</p> <p><u>Solar Pumping:</u> PWD has installed several solar powered borehole pumps for village water supply, all of which have had technical problems and most are not operating.</p>	
Wind	<p>Estimated wind speeds between 3.7 – 4.8 m/s. FEA is beginning monitoring for proposed wind farms of 25 MW capacity on all three islands served. 5-15 MW of wind systems. A small 20 kW Vergnet wind system was installed at MRD’s headquarters in Suva in 2004, which was dismantled in 2006.</p>	<p>DoE is monitoring the wind resource in several islands.</p>	<p>Butoni Wind Farm project by FEA experienced issues including surveying errors, an overly optimistic resource assessment, unwillingness of a competent private sector partner to team up with FEA, contractual issues related to maintenance of generators, significant short fall of generation (in 2008 Butoni produced only 3 GWh as opposed to the projected 11 GWh). As a consequence electricity supply cost from this major renewable energy facility is not competitive with fossil fuel based generation, indicating that the investor has poorly managed the risk of this project.</p> <p>FEA is currently investigating wind potential for the Labasa, Savusavu and Ovalau grids.</p>
Diesel/Wind /PV hybrid	<p>Nabouwalu Hybrid Power Project It is still a potential. The potential for diesel/RE hybrid systems will always depend on sites monitored for wind. This will always form a hybrid with diesel gensets.</p>	<p>In 1997, a diesel/wind/PV hybrid was set-up comprising eight 6.7 kW wind turbines, 37.4 kW of PV and 200 kVA of diesel. The design demand is 720 kWh/day. About 60% of this is to be generated from renewable energy sources. Initially, wind and solar did contribute over 60% but this fell steadily to less than 15% due to loss of technical support, lack of local capacity to train operators and technicians, and component failures, particularly the complex automatic interface between solar, wind and diesel generators. Furthermore, PWD had no incentive to maintain wind and solar components as fees only covered 30% of operating costs. This resulted in “diesel creep”– the increase in diesel component of hybrid energy systems as diesel operation is easier and better understood compared to wind and solar components.</p>	<p>The Department of Energy is currently working on the rehabilitation of the whole project. Tendering works are currently underway.</p>

RE Resource	Summary of Estimated Potential (as of 2004)	Summary of Past Experiences (as of 2004)	Summary of Experiences (as of 2010)
Hydro	200 MW with an average annual output of 1,000 GWh. Micro-hydro (under 100 kW) and mini-hydro (100-1,500 kW)	<p>38 of these smaller sites on six islands totaling 3.2 MW appear to be technically and economically feasible, 20 sites totaling 0.4 MW require more monitoring, and many other sites are yet to be assessed.</p> <p><u>Micro-hydro:</u> Since 1980, five village-scale hydro systems have been built for small electrical loads. Main technical problems are due to electrical systems due to difficulty in accessing site and limited technical skills resulting in long power outages and high repair costs.</p>	The installed capacity of micro/mini hydro is 1,000 kW, 80% of which is accounted for by FEA's Wainikeu system in Vanua Levu. Four sites being monitored and considered for development by DoE have a combined potential of at least 220 kW and possibly far more.
Ocean	Prior measurements indicate a promising differential temperature of 22°C between the surface and 800m depth, which is sufficient to harness electric power. Additionally, annual average wave power of 22.9kW/m of wave-front has been determined.	Wave and ocean thermal energy are promising in the long term but no suitable commercial equipment is available for installation. The tidal energy resource in Fiji is very low and has little potential for development.	The DOE is currently working with USP on the monitoring of the wave and tidal energy in Baravi, Sigatoka and Mamanuca in Yasawa respectively.
Geothermal	5-15 MW	Costly drilling is necessary to confirm the magnitude of the resource and the cost of development is high.	Geothermal is now seen as a potential base power supply for the main grid. Talks are now held between the DOE and the Mines Department, which looks after geothermal resources and their heat. The plan is to get geothermal energy developed within the next 5 years.

Barriers to Development and Commercialization of Renewable Energy

14. The national assessment in 2004 identified numerous barriers to development and commercialization of renewable energy in Fiji. The key barriers that will be covered as part of FREPP are summarized in Table 2 below. Since the 2004 assessment, Fiji has made progress in addressing some of these barriers such as the approval of a National Energy Policy, discussions and initial activities to reform the Fiji Electricity Authority, approval of incentives to promote RET investments, increase of FEA's tariffs, land reform programmes to address land access and security issues, access to professional development opportunities to energy sector staff, resource assessment of hydro-electric resources, establishment of RE markets in rural areas (particularly for biofuels, biogas and solar home systems), assessments and feasibility sites identified for wave and ocean thermal resources and ongoing monitoring on wave and tidal resources, allocation of funds resulting in 80% rural electrification and reforms to address outer-island transportation issues.

Table 2: Barriers to Commercial RE-based Power Generation in Fiji

Identified Barriers (2004)	Status (2010)	Planned Interventions by Government ⁴
<i>Economic reforms</i>		
Existing electricity legislation does not include cost-effective energy conservation (i.e. demand side management), and preference for renewable energy-based electricity generation (where cost-effective), in FEA's objectives. FEA does not have legal basis and incentives to provide efficient energy services. It should not just sell electricity.	With the continuous rise in fuel prices, the FEA is not only concerned with the producing of electricity but has also put more focus on the efficient use of electricity.	Discussions and initial steps to reform FEA commenced in 2010. To be completed by 2012 due to the fact that FEA has always been the major player in the industry and there is no competition with other companies hence FREPP will facilitate an enabling environment for completion of work.
No incentives to promote RET investments, (e.g. "green" interest rates, tax incentives for businesses, assistance in accessing foreign investment for RETs)	Incentives have been put in place such as waiving of duty on renewable energy imports, FEA rebates on top hundred energy saver domestic consumers.	Further expansion of scope will be done under FREPP.
No preferential import duties on energy efficient appliances or renewable energy technologies	Incentives have been put in place and are being evaluated on a case-by-case basis.	
Un-enacted legislation providing the legal basis for RESCO operations	Legislation yet to be formulated.	Will be covered under the FREPP project.
Low price for electricity generated from renewable energy resources is unattractive for investment in renewable energy	Recently (2010) there has been an increase on FEA's tariffs indicating a move towards a tariff that reflects actual costs.	With the increase in FEA's tariff and the Reform of FEA, this will create an environment to attract investments for
Policy of a single national tariff for grid-	The recent increase in	

⁴For government and donor-funding

Identified Barriers (2004)	Status (2010)	Planned Interventions by Government ⁴
based electrification, and heavily subsidized PWD and village electrification, makes it impossible for private developers to profitably take over rural public grid systems (e.g. those at government provincial centers) or to develop new ones (e.g. Fiji's third largest island of Taveuni)	tariff and the reform of FEA which is currently underway will enable more investments for grid-based electrification.	grid-based electrification. Tariff study to be undertaken through the SEFP World Bank Project.
<i>Organizational & Operational</i>		
Brain-drain due to continuing high rate of migration from Fiji to other countries hinders sustainable institutional development for planning and operating renewable energy systems at both the village scale and at large scale	All staff members within the Energy Sector are continuously trained in different programs related to Renewable Energy or Energy in general. Training Institutions such as FNU, USP have put in place Renewable Energy training programs.	To be expanded under the FREPP project through reform of the Energy Sector.
No sustainable institutional framework to develop and operate rural electrification on a commercial basis, including fee collections, and provide reliable service. FEA grid extensions are a partial exception but capital costs of some remote extensions are highly subsidized	Very little change	A sustainability framework to be put in place under the FREPP project.
Insufficient knowledge of Fiji's large-scale (and mini) hydroelectric resource, with little long-term monitoring in recent years and relatively poor knowledge of geothermal and wind energy resource	Recently the DOE published a Hydro Potential Report on all surveys undertaken on Fiji's rivers by the DOE. With available funds, the DOE through JICA has been able to quantify hydro potential in many of Fiji's major rivers. The DOE continues to survey and monitor wind potential in areas around Fiji.	The DOE continues to survey and monitor hydro potential sites. With respect to wind, in-depth analysis and evaluation are to be undertaken for feasible sites using wind analysis software. To be improved under FREPP.
Limited understanding of rural market for energy, making it difficult to determine appropriate technology for use in different areas	Renewable energy markets have been established in rural areas especially for Biofuels, biogas and SHS.	To be improved under FREPP under relevant components.
No national standards or certifications to assure that RETs imported into Fiji are suitable for local conditions	No change	To be improved under the FREPP Project under relevant components.
High risks associated with past project failures making private sector involvement difficult to obtain without inclusion of risk abatement incentives	Incentives have been provided including waiving of duty on renewable energy	Demonstration projects under the FREPP project is aimed at alleviation of risks.

Identified Barriers (2004)	Status (2010)	Planned Interventions by Government ⁴
	technology imports. Training courses on Renewable Energy Technologies have been put in place by USP and FNU.	
<i>Financial</i>		
Allocation of funds to DoE is insufficient for development of adequate internal capacity for: (a) Undertaking resource assessments; (b) Procurement of equipment for ascertaining potential of the various renewable energy resources in Fiji; and, (c) Preparing complex project documents needed for accessing international finance, for resource assessment, management of large-scale renewable energy development processes and for day-to-day regulation of those processes.	Capacity currently being developed.	To be improved under the FREPP Project. Other interventions to address other financial barriers.
<i>Environmental</i>		
Fiji's vulnerability to natural disasters, particularly cyclones, that can damage equipment and resources needed to produce energy	Mandatory requirement for all project proposals to include risk analysis and mitigation strategies for approval.	Potential risk monitored under FREPP Project that will impact project operations.

15. However, additional efforts are required to complement and strengthen government's efforts in order to address key current barriers. Additional efforts facilitated through the FREPP Medium Sized Project include an enabling energy legislation to promote preference for RE-based electricity generation where cost-effective, a technical training programme to provide professional development opportunities to energy sector staff to reduce risk of project failures due to lack of technical expertise, demonstration schemes on bio-fuel and waste-to-energy to prove RE-based commercial electricity generation, and institutional capacity of relevant government agencies to retain staff and institutional memory and reduce high migration rate.

Baseline Scenario

16. According to the recently published "National Energy Security Situation Report" (March 2010), FEA supplies electricity to approximately 90% of the urban areas in the country but lacks sufficient back-up and emergency power supply to cushion impacts of fuel crisis. Even though plans that are in-place indicate sufficient reserve margin, increasing demand within the next 15 years is projected to reduce the overall reserve margin substantively. Furthermore, the report also stated that power supplies in rural and remote areas are presently inadequate even in the supply of minimum petroleum products requirements.

17. In a business-as-usual scenario, FEA is expected to continue to meet additional demand (at an average annual growth rate of 4%) by increasing fossil fuel-based power generation. Hence, a significant amount of heavy fuel oil consumption is envisaged for the next 15 years implying corresponding increases in GHG emissions. The FEA's target is to generate 90% of the electricity demand through RE by 2011.

18. However, due to the political crisis in 2006 and associated financial constraints, this target has been shifted to 2014 with possible slippages foreseen for three to four years. Recently (June 2010), improvements in tariff pricing have since been made that would attract IPPs or private renewable energy investors to boost renewable energy-based power generation in Fiji. The absence or lack of an enabling environment that will facilitate investments on RE-based power generation, address technical and information barriers pertaining to availability and technical feasibility of harnessing RE resources, support markets for specific renewable energy technologies, and integrate renewable energy developments into national energy plan, will continue. With FREPP, these barriers will be removed and thus make FEA's target more achievable.
19. Table 3A shows the supply and demand projections for electricity generation under a business-as-usual scenario over a 15-year timeframe commencing 2010. As noted in Table 3, with Fiji's major power supply being generated from hydro, RE electricity make up about 57.6% of Fiji's electricity generation in 2010. By 2015, it is forecast that RE electricity will account for about 64.2% of the electricity generated in Fiji. In terms of the energy used for power generation, in 2010, about 73.3% of the energy used for producing electricity is supplied by RE (mainly hydro), and by 2015, RE (hydro and biomass) will account for 83.3% of the energy forms used in power generation.
20. As the total electricity demand grows from 942 GWh in 2010 to an estimated 1,435 GWh in 2025, non-fossil fuels (i.e., RE) will continue to be the dominant energy source but at a percentage lower than the FEA RE target for 2014 (90% from RE). With the utilization of RE for power generation, the GHG emissions from Fiji's power sector is forecast to go down at an average annual rate of 2.2% (see Table 3B).

Table 3A: Forecast Electricity Supply & Demand (Baseline Scenario)

Particulars/Year	2010	2015	2020	2025
Total Power Demand, GWh	942.0	1096.0	1278.0	1435.0
HYDROPOWER, GWh				
<i>Wailoa Hydro (80MW)</i>	400.0	400.0	400.0	400.0
<i>Wainikasou Hydro (6.5MW)</i>	18.0	18.0	18.0	18.0
<i>Nagado Hydro (3MW)</i>	19.0	19.0	19.0	19.0
<i>Nadarivatu (40MW by 2011)</i>	0.0	101.0	101.0	101.0
<i>Wailoa Downstream Hydro Power Station (10MW by 2015)</i>	0.0	40.0	40.0	40.0
<i>Wainusavulevu Weir Raising (2013)</i>	0.0	6.0	6.0	6.0
THERMAL POWER, GWh				
<i>Diesel VLIS</i>	103.0	104.0	110.0	125.0
<i>HFO</i>	260.0	300.0	340.0	370.0
WIND and SOLAR POWER, GWh				
<i>Wind Farm</i>	1.0	1.0	1.0	1.0
<i>Solar Panel</i>	0.0	0.0	0.0	0.0
FEA POWER DEVELOPMENTS				
<i>Biomass - baggase, GWh</i>	32.0	52.0	60.0	60.0
<i>Biomass - wood, GWh</i>	24.0	86.4	120.0	140.0
TOTAL RE, GWh	494.0	723.4	765.0	785.0
TOTAL Non-RE, GWh	363.0	404.0	450.0	495.0
% RE Electricity, GWh	57.6%	64.2%	63.0%	61.3%
Total Power Generation, GWh	857.0	1127.4	1215.0	1280.0

Table 3B: Baseline Scenario Analysis

Year	2010	2015	2020	2025
Total Power Demand, GWh	942.0	1096.0	1278.0	1435.0
Total Power Generation, GWh	857.0	1127.4	1215.0	1280.0
- RE Electricity, GWh	494.0	723.4	765.0	785.0
- Fossil Fuel Generated Electricity, GWh	363.0	404.0	450.0	495.0
- % RE Electricity	57.6%	64.2%	63.0%	61.3%
Total Energy Usage for Power Generation, ktoe	422.2	754.2	908.6	991.5
- RE Consumption, ktoe	309.3	628.3	768.3	837.2
- Non-RE Consumption, ktoe	112.9	125.9	140.3	154.3
- %RE in Power Generation Mix	73.3%	83.3%	84.6%	84.4%
GHG Emissions in Power Generation, ktons CO2	316.4	353.0	393.6	432.7
SUMMARY				
Overall Power Generation (2010 -2025), GWh	18015.0			
Overall RE Electricity Production (2010 - 2025), GWh	10697.3			
Overall Energy Consumption (2010 - 2025), ktoe	11416.4			
Overall RE Consumption (2010 - 2025), ktoe	9366.4			
Overall GHG Emissions (2010 - 2025), ktons CO2	5747.4			

GEF Alternative

21. Through the proposed FREPP, a much better and desirable scenario (i.e., GEF alternative scenario) compared to the baseline will be facilitated through the removal of target key barriers. This could leverage capacity to co-finance. Lessons learned from past and complimentary ongoing RE initiatives funded by government and donors are taken into account in the design of the activities that will bring about the proposed GEF alternative scenario.
22. Table 4A shows the supply and demand projections for electricity generation under the GEF alternative scenario, which features more intensive involvement of private sector (mainly Independent Power Producers – IPPs) in the electricity sector of the country over a 15-year timeframe commencing 2010. The table shows that as in the baseline RE electricity accounts for about 57.6% of Fiji’s electricity generation in 2010. By 2015, it is forecast that RE electricity will account for about 67.7% of the electricity generated in Fiji. In terms of the energy used for power generation, by 2015, RE (hydro and biomass) will account for about 89.0% of the energy forms used in power generation. This will be at 90.8% in 2025.
23. In the Alternative Scenario, the total electricity demand grows from 989 GWh in 2010 to an estimated 1,488 GWh in 2025. This takes into consideration projected growth rate in households in rural areas particularly those not covered by FEA service. The non-fossil fuels (i.e., RE) will continue to be the dominant energy source and a percentage equal to the FEA RE target for 2014 (90% from RE).
24. With the increased utilization of RE (particularly the planned biomass-based power generation projects) for electricity production and meet the country’s electricity demand, the cumulative GHG emissions from Fiji’s power sector is forecast to go down significantly, at 11.1% by 2015, 15.0% in 2020, and 16.1% in 2025. See Tables 4B & 5.

Table 4A: Forecast Electricity Supply & Demand (Alternative Scenario)

Particulars/Year	2010	2015	2020	2025
Total Power Demand GWh	989.0	1144.9	1328.9	1488.0
HYDROPOWER (GWh)				
<i>Wailoa Hydro (80MW)</i>	400.0	400.0	400.0	400.0
<i>Wainikasou Hydro (6.5MW)</i>	18.0	18.0	18.0	18.0
<i>Nagado Hydro (3MW)</i>	19.0	19.0	19.0	19.0
<i>Nadarivatu (40MW by 2011)</i>	0.0	101.0	101.0	101.0
<i>Wailoa Downstream Hydro Power Station (10MW by 2015)</i>	0.0	40.0	40.0	40.0
<i>Wainusavulevu Weir Raising by 2013</i>	0.0	6.0	6.0	6.0
THERMAL POWER, GWh				
<i>Diesel VLIS</i>	103.0	104.0	110.0	125.0
<i>HFO</i>	260.0	300.0	340.0	370.0
WIND and SOLAR POWER, GWh				
<i>Wind Farm</i>	1.0	1.0	1.0	1.0
<i>Solar Panel</i>	0.0	0.0	0.0	0.0
FEA POWER DEVELOPMENTS				
<i>Biomass – baggase, GWh</i>	32.0	52.0	60.0	60.0
<i>Biomass – wood, GWh</i>	24.0	86.4	120.0	140.0
INCREMENTAL POWER PRODUCTION, GWh				
<i>Biofuels</i>	0.0	14.7	14.7	14.7
<i>IPP (biomass-fired PP), 3.2MW</i>	0.0	21.3	21.3	21.3
<i>Other RE projects (Biomass - wood 86.6MW ~ 355GWh)</i>	0.0	89.0	107.0	178.0
TOTAL RE Electricity, GWh	494	848.4	908.0	999.0
TOTAL Non-RE Electricity, GWh	363	404	450	495
% RE Electricity	57.6%	67.7%	66.9%	66.9%
Total Power Generation, GWh	857	1252.4	1358.0	1494.0

Table 4B: Alternative Scenario Analysis

Year	2010	2015	2020	2025
Total Power Demand, GWh	989.0	1144.9	1328.9	1488
Total Power Generation, GWh	857.0	1252.4	1358.9	1494.0
- RE Electricity, GWh	494.0	848.4	908.0	999.0
- Fossil Fuel Generated Electricity, GWh	363	404	450	495
- % RE Electricity	57.6%	67.7%	66.9%	66.9%
Total Energy Consumption for Power Generation, ktoe	422.2	1141.5	1358.0	1685.3
- RE Consumption, ktoe	309.3	1015.6	1217.6	1531.0
- Non-RE Consumption, ktoe	112.9	125.9	140.3	154.3
- %RE in Power Generation Mix	73.3%	89.0%	89.7%	90.8%
GHG Emissions in Power Generation, ktons CO2	316.4	278.3	308.8	307.5
- % Reduction in GHG emissions	0.0	11.1%	15.0%	16.1%
SUMMARY				
Overall Power Generation (2010 -2025), GWh		18831.3		
Overall RE Electricity Production (2010 - 2025), GWh		12251.3		
Overall Energy Consumption (2010 - 2025), ktoe		16293.6		
Overall RE Consumption (2010 - 2025), ktoe		14243.6		
Overall GHG Emissions (2010 - 2025), ktons CO2		4824.8		

25. Comparing the two development scenarios in Fiji's electricity sector shows that with the increased utilization of RE resources for power generation to meet the electricity demand of the country in the next 15 years, the GHG emissions from the country's power sector are modestly reduced. As a result of the increased use of RE resources for power generation during the period 2010-2025, about **16.1%** of the overall GHG emissions are reduced, as compared to the baseline scenario, which will happen if the FREPP is not implemented. With the FREPP, an overall **14.5%** increase in RE electricity production (2010-2025) compared to the baseline scenario will be achieved. This translates to an overall **52.1%** increase in the use of RE resources for power generation in Fiji from 2010 to 2025 compared to the baseline scenario. By 2015, the target 90% contribution of RE resources in the energy use for power generation would have been and is expected to be exceeded.

Table 5: Comparative Analysis of Alternative and Baseline Scenarios

Year	2010	2015	2020	2025
Δ Total Demand, GWh	47.0	48.9	50.9	53.0
Δ Total Power Generation, GWh	0.0	125.0	143.0	214.0
- Δ RE Electricity, GWh	0.0	125.0	143.0	214.0
- Δ Fossil Fuel Generated Electricity, GWh	0.0	0.0	0.0	0.0
- Δ %RE Electricity	0.0	3.6	3.9	5.5
Δ Total Energy Usage for Power Generation, ktoe	0.0	387.3	449.3	693.8
- Δ RE Consumption, ktoe	0.0	387.3	449.3	693.8
- Δ Non-RE Consumption, ktoe	0.0	0.0	0.0	0.0
- Δ %RE in Power Generation Mix	0.0	5.7	5.1	6.4
Δ GHG Emissions in Power Generation, ktons CO2	0.0	-74.6	-84.9	-125.2
SUMMARY				
Overall Power Generation (2010 -2025), GWh		816.3		
Overall RE Electricity Production (2010 - 2025), GWh		1554.0		
% Increase in RE Electricity		14.5%		
Overall Energy Consumption (2010 - 2025), ktoe		4877.2		
Overall RE Consumption (2010 - 2025), ktoe		4877.2		
% Increase in RE share to Power Generation Mix		52.1%		
Overall GHG Emissions (2010 - 2025), ktons CO2		-922.6		
% Reduction in GHG Emissions		-16.1%		

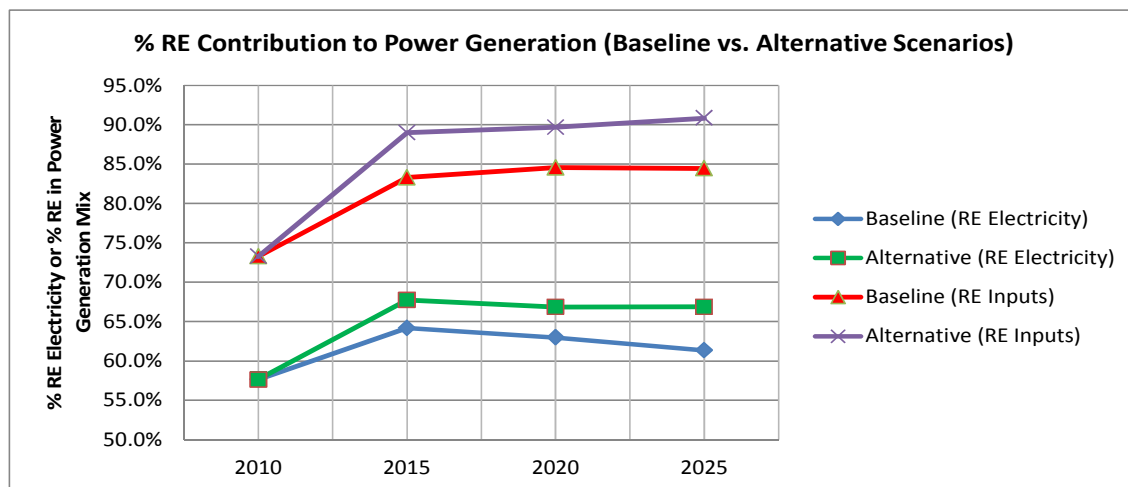


Fig. 1: Comparison of %RE Share & % RE Electricity in Power Generation (2010-2025)

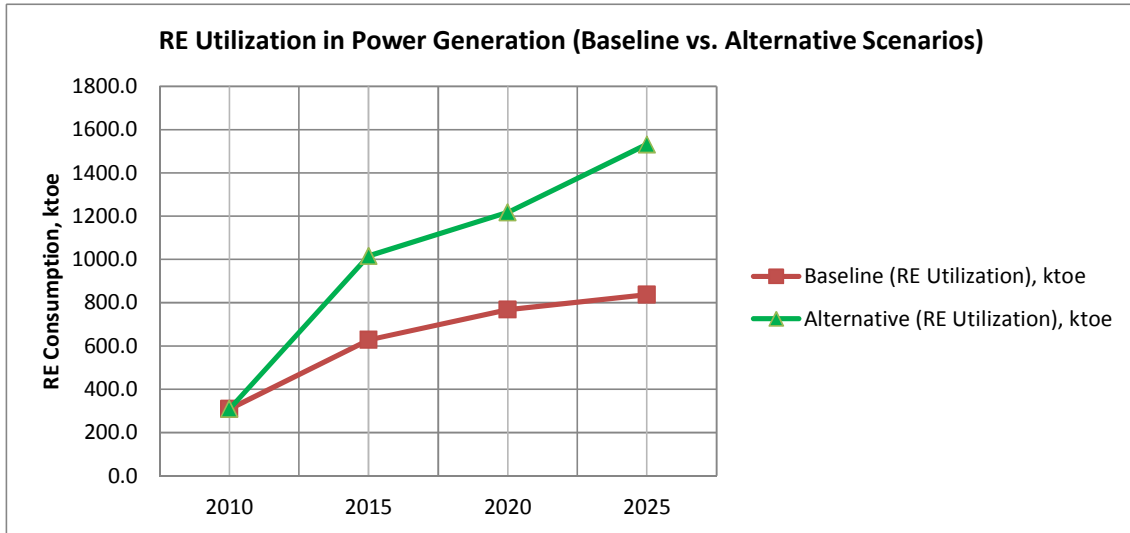


Fig. 2: Comparison of RE Utilization in Power Generation 2010-2025

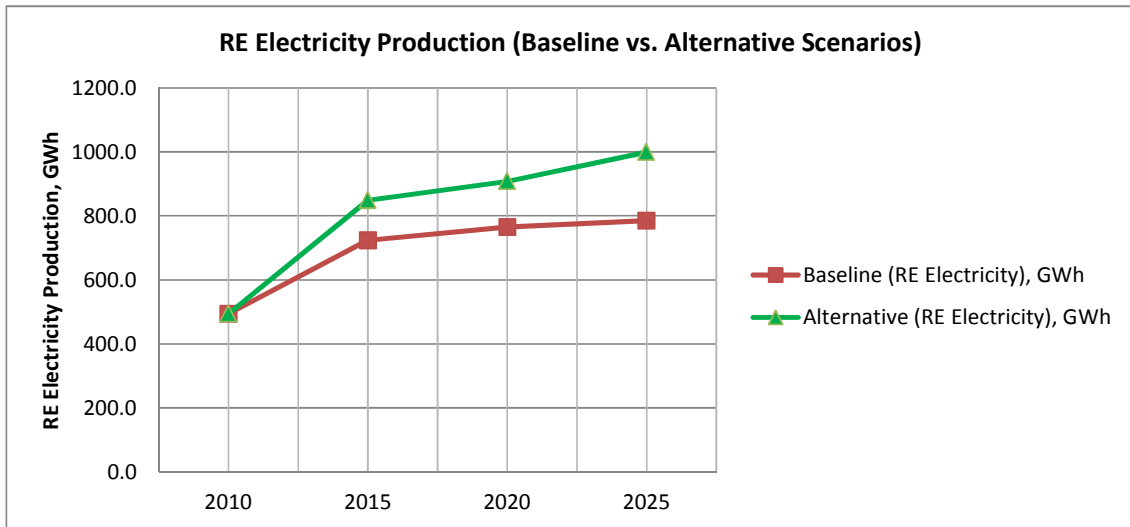


Fig. 3: Comparison of RE Electricity Production 2010-2025

2. STRATEGY

Project rationale and policy conformity

26. The FREPP is in line with the GEF-4 the Strategic Program 3 on promoting market approaches for the supply of renewable electricity in utility scale grid-based power systems; and Strategic Program 4, on promoting sustainable energy production from biomass and modern uses of biomass. The proposed project will focus on the removal of barriers (policy/regulatory, market, finance, and technical) to the wide scale use of RE resources for grid-connected power generation in Fiji. In addition, the project will address barriers to the use of biomass resources for the production of on-grid electricity.

27. It involves activities that will investigate suitability and sustainability of producing bio-fuels to substitute imported petroleum products, ensuring that biomass production, conversion and

energy use is sustainable. The project would: (i) Facilitate investments on energy projects particularly on RE-based power generation; (ii) Address technical and information barriers pertaining to availability and technical feasibility of harnessing RE resources; (iii) Support markets for specific renewable energy technologies; and, (iv) Integrate renewable energy developments into national energy plan.

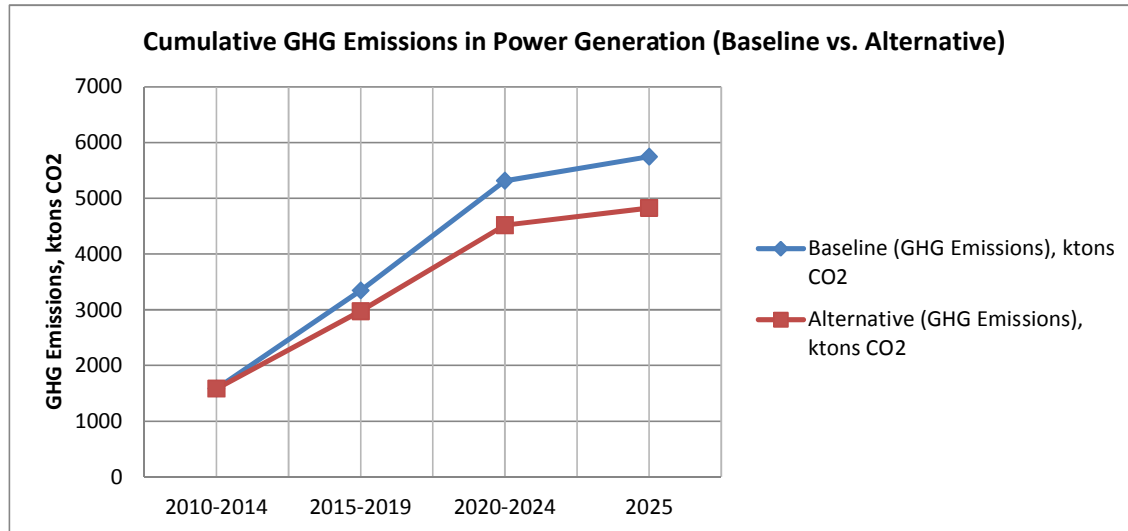


Fig. 4: Comparison of Cumulative GHG Emissions in Power Generation 2010-2025

28. The project would complement Fiji’s climate change mitigation strategy currently being developed through Fiji’s Second National Communications (SNC) to the UNFCCC. While Fiji is a minor emitter of greenhouse gases, as highlighted in its Initial National Communications to the UNFCCC, Fiji strives to be a showcase for the rest of the world by reducing any potential impacts on the global climate and related systems. In addressing the issue of climate change, Fiji has endeavoured to plan its development in a sustainable manner, ensuring that the data/information gathered in its national GHG inventory will be used in the preparation of national sustainable development strategies and for assessing the success of such strategies over time.
29. The project is in accordance with UNDP’s strategic area of support for Fiji in building national capacity for participation in global conventions, regulatory regimes and funding mechanisms for environmentally sustainable development. This proposed project will contribute to the achievement of the objective of making global environmental concerns and commitments integrated in national development planning and policy. Some of the envisioned activities in the project will be in line with the UNDP’s objective of enhancing the performance of the public sector institutions in participatory national planning and policy development.

Country ownership: country eligibility and country drivenness

30. The Government of Fiji ratified the United Nations Framework Convention on Climate Change (UNFCCC) on February 25, 1993. As a Party to the UNFCCC, Fiji has assumed certain commitments and obligations to contribute to the ultimate objective of the UNFCCC, which is to achieve the “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system”. Although Fiji has stepped up its efforts to mitigate climate change through adopting RETs

that would reduce GHG emissions maximizing the full benefits in order to reduce fuel imports is still a challenge.

31. The FREPP is in line with the overall plan of the Government of Fiji through its “Roadmap for Democracy and Sustainable Socio-Economic Development 2009 – 2014”. Furthermore, the FREPP is consistent with the priorities outlined in National Energy Policy (NEP) that has the vision of ‘A sustainable energy sector for Fiji’ and a mission ‘To provide an enabling environment for a sustainable energy sector’. The implementation of the NEP began in 2007 and is due to be reviewed in 2011. The Strategic Action Plan includes activities that cover 5-year period (2007-2011) which are reviewed annually.
32. There are four key strategic areas in the NEP all of which are of relevance for this proposed project: (1) National energy planning with the strategic objective to strengthen the capacity for energy planning through appropriate policy, regulatory and implementation frameworks and effective and efficient management; (2) Energy security with the strategic objective to enhance energy security through greater participation and collaboration within the industry; (3) Power sector with the strategic objective to increase access to affordable and reliable electricity services; and (4) renewable energy with the strategic objective of research, promotion and utilization of renewable energy applications.
33. Concerning national energy planning, the relevant policies includes: strengthening the capacity of DOE to plan, formulation, implementation and management of the energy policy and other energy related policies and regulations; ensuring appropriate policy and regulatory frameworks for the provision of energy services and strengthening coordination and consultation with other sectors and the external environment on energy developments.
34. Concerning energy security, the relevant policies includes: promote the development of indigenous energy sources such as hydropower, geothermal, solar, wind and biomass and strengthen energy security and improve energy supply mix for the country⁵. With regard to the power sector the policy is to ensure the demand for reliable and affordable electricity is adequately met. Finally concerning renewable energy the policy is as to promote the use of renewable energy resources in the country. Moreover environmental compatibility is one of six cross-cutting areas mentioned in the NEP. Specifically the following is mentioned: ‘There are increasingly detrimental economic and environment impacts of energy use, particularly from fossil fuels. In recognizing the environmental effects of energy initiatives, it is intended that all energy initiatives will pay serious attention to environmental issues and in particular the impact of energy projects on land, water and air. Any proposed energy development will include environmental impact assessment. By incorporating the principle of environmental compatibility into energy sector planning, the negative environmental impacts can be lessened’.

Design principles and strategic considerations

35. The FREPP was designed with a combination of upstream and downstream interventions that include creating an enabling environment for the involvement of the private sector and strategically chosen demonstrations, building on, and enhancing the work of others, coordination and collaboration with relevant national and regional initiatives and partners including proactive sharing of information, county-led project preparation and

⁵ As part of its mission statement the government-owned power utility – Fiji Electricity Authority (FEA) has a target of generating 90% of its energy through renewable energy resources by 2011. In 2008, FEA generated 68% of the total electricity requirements using own hydro and wind power generation and buying biomass generated power from Independent Power Producers (IPPs).

implementation, sustainable and least cost power sector expansion, and focus on mature RE technologies that are proven in Fiji's context.

36. It is anticipated that investments that will be facilitated and/or influenced through the envisioned barrier removal activities of this project, as well as the support provided to strategically important RE demonstration projects will result in global CO₂ emission reductions through the displacement of petroleum products used for power generation.
37. The FREPP will facilitate the creation of an alternative scenario where the overall percentage contribution of renewable energy to the power generation mix of the country reaches 90%, which is also the target set by FEA for the country's national electricity plan. Demonstration on the planning, design, engineering, financing, installation, and operation of RE-based power generation plants will be carried out. This is for showcasing the commercial aspects of RE-based power generation. There will be 2 demonstrations to be implemented: (1) Large scale grid connected waste-to-energy plant; and, (2) Small scale mini-grid biodiesel power generation plant. These 2 demonstrations are expected to achieve a combined CO₂ emission reduction of about 468 ktons (based on 10 years operations).
38. Concerning national level benefits, preliminarily, the expectations are the following: (1) Facilitation of investments on energy projects, particularly on RE-based power generation; (2) Technical feasibility of harnessing RE resources are ascertained and made widely known; (3) Supporting markets for specific renewable energy technologies and (4) Renewable energy developments integrated into National Energy Plan towards 90% Electrification of Fiji.
39. The Government of Fiji has taken various steps in the past and present to address the long-term effects of high dependence in petroleum fuels and environmental problems in the country. Significant legal and regulatory frameworks and policies have so far been issued and in the context of climate change mitigation, a recent partnership was made with the Government of Japan to cooperate on the reduction of the growth of fossil fuel utilization. Fiji is currently participating in two on-going regional renewable energy projects supported by the GEF. These are the: (1) GEF/SPREP/UNDP Pacific Islands Greenhouse Gas Abatement through Renewable Energy Project (PIGGAREP)⁶; and; (2) GEF/WB Sustainable Energy Financing Project (SEFP)⁷. For 2010, the planned PIGGAREP supported in-country activities in Fiji include a Technical Assistance (TA) on Residential roof-top PV grid –connected system study for the main island of Viti Levu, enhancement of the Energy Information Systems and the implementation of a RESCO Manager (a computer software management tool) for the Fiji SHS Program. FREPP would complement these two projects, as well as past, on-going and planned national and regional interventions on RE development and utilization to increase the project impact, and avoid duplication of efforts. Specifically, the following coordination mechanisms would be utilized:
 - The implementing partner for FREPP is the Fiji Department of Energy (DOE), which also is the national focal point for PIGGAREP and SEFP. This in itself will facilitate coordination of GEF supported RE interventions in Fiji, and will be addressing different gaps and aspects of increasing the use of commercially viable renewable technologies.
 - Since UNDP is also the GEF Implementing Agency for PIGGAREP, coordination with the PIGGAREP team can be guaranteed, thereby ensuring synergy and complementarities

⁶ The objective of PIGGAREP is the promotion of the productive use of renewable energy to reduce GHG emissions by removing the major barriers to the widespread and cost-effective use of commercially viable renewable technologies.

⁷ The SEFP aims to significantly increase the adoption and use of renewable energy technologies in participating Pacific Island states including Fiji through a package of incentives to encourage local financial institutions to participate in sustainable energy finance in support of equipment purchase.

of the activities that will be carried out. Practically this will be done through consultations with SPREP, which is the Executing Agency for PIGGAREP.

- SPC Regional Energy Programme – as the new regional lead coordination agency in energy with its focus on capacity development, capacity supplementation including research and development and, data and information, FREPP activities will be complemented and enhanced through various planned regional initiatives supported by SPC.
- The University of the South Pacific (USP) is a regional academic institution that provides services through its large Fiji-based as well as its smaller country centers in all member countries of the Pacific. USP's School of Engineering & Physics under the Faculty of Science, Technology & Environment is involved in a number of teaching, training and research-based capacity building activities. USP is currently implementing a regional Clearing House Mechanism project funded by Korea that would add value to FREPP activities.
- Barriers related to financing of RE-based power generation projects will be coordinated with the SEFP project in Fiji, which focuses on innovative financing.
- In 2008, UNDP joined several development partners including the WB, ADB, European Union, NZAID and AusAID to establish the Pacific Energy Donor/International Financial Institutions (IFI) Working Group. This group has been established to facilitate coordination and collaboration among donor agencies and IFIs supporting PIC energy sectors in sharing of information and data, and joint funding of activities where appropriate. This is one of the mechanisms that will be used to facilitate that there will be clear work of responsibility between the proposed project and the SEFP.

Project goal, objective, outcomes and outputs/activities

40. The goal of FREPP is the reduction of greenhouse gas emissions from Fiji's power sector. This will be accomplished by replacing fossil fuels with renewable energy resources such as biomass. The objective of the project is the removal of barriers to the widespread and cost-effective of grid-based renewable energy supply via commercially viable renewable energy technologies. The following are the expected outcomes from the FREPP:

- Facilitation of investments on energy projects particularly on RE and biomass based power generation;
- Technical feasibility of harnessing RE resources are ascertained and made widely known;
- Markets for specific renewable energy technologies are supported; and
- Renewable energy developments integrated into National Energy Plan towards 100% electrification of Fiji.

41. The proposed GEF-supported project will contribute to the improvement of the energy situation in Fiji from a continued utilization of fossil fuels to a sustainability of RE usage. The proposed 3-year project comprises four components, each addressing specific barrier categories. The following describes each project component, the outcomes from each of them, the outputs and activities that will facilitate the realization of component outcomes.

Component 1: Energy Policy & Regulatory Frameworks

42. Through this component, the Fiji Government endeavours to put in place an overarching legal/regulatory framework on energy, based on a clear and consistent energy policy. This will be in the form of a formulated Energy Act that will be enacted and enforced through a set of clearly defined implementing rules and regulations that will guide developments in the energy sector including in the area of renewable energy development and utilization. This

component aims to address the policy and regulatory barriers that hinders the wide-scale development and utilization of Fiji's indigenous RE resources. The outcome from the expected outputs that will be delivered under this component is the facilitation of investments on energy projects, particularly on RE-based power generation. To realize this outcome, the activities that will comprise this component will deliver the following tangible outputs:

Output 1.1: Enacted and Enforced Fiji Energy Act

43. The DOE will undertake and/or oversee activities expected to facilitate and/or influence the enactment and enforcement of the Energy Act. These include: (1) Review of current legislation to come up with relevant improvements based on the NEP for incorporation in an Energy Act and preparation of a discussion paper on need and scope for energy legislation; (2) Preparation of, and discussions on, and submission of a Policy Issues Paper for Cabinet approval; (3) Drafting of the proposed Energy Act; (4) Consultation with Government authorities, private sector entities, energy sector entities, including FEA on the Energy Act; (5) Consultation meetings and advocacy campaigns with Government lawmakers to promote and secure support for the approval of the Energy Act; and, (6) Submission to Cabinet for approval and promulgation of the Energy Act.
44. Success of the delivery of this output is measured by the following specific indicators, which include: the number of proposed articles on the Energy Bill that are endorsing RE-based power generation in Fiji by June 2012; a cabinet-approved comprehensive Energy Act promulgated by December 2012; and, commencement of institutional reform of DOE to effectively administer the Fiji Energy Legislation by June 2012.
45. Activity 1.1.1: Review of Existing Energy Legislation and Conduct of Studies on Improving Energy Legislation - This activity involves the conduct of an analysis of the existing energy legislations in the country, studying their features, and how can these be improved (modify, revise or used as bases for a new one) in order to support RE-based power generation (its application and commercialization) in Fiji. Based on the analysis information gathered, studies will be carried out to come up with the relevant modified or new energy legislations. As part of the study process, consultations will be carried out with key stakeholders to get their opinions and suggestions regarding the improved energy legislations that would be formulated and proposed. The findings and recommendations of the review and the subsequent studies on the energy legislation (Bill/Act) will be prepared and published, and presented in a workshop.

GEF support is required for the required technical assistance in the conduct of the review and studies, as well as in the publication and presentation of the results.

46. Activity 1.1.2: Preparation and Submission of a Policy Issues Paper for Cabinet Approval - This activity involves the conduct of a policy study on the development and utilization of feasible available RE resources in the country for commercial power generation, as part of the country's overall energy legislation. The policy study will produce a policy paper that will be presented to key stakeholders (representing the public) in a workshop to solicit their comments and suggestions. The energy policy will be formulated considering the comments and recommendations of the public. With the support of concerned legislators the formulated energy policy is finalized and submitted for Cabinet Approval. Advocacy and lobbying efforts will be carried out to get the support for the approval of the policy by the Cabinet.

GEF support is required for the technical assistance in the conduct of the policy study and energy policy formulation, as well as for expenses to be incurred in the socialization of the proposed policy with the stakeholders and legislators.

47. Activity 1.1.3: Drafting of the Proposed Energy Act – The focus of this activity is the formulation of the proposed Energy Act. The outputs of Activity 1.1.1 and 1.1.2 will be utilized in formulating the relevant regulatory/legal texts of the proposed Act. Other inputs from available technical papers, and possible, texts from other similar Energy Acts/Laws in other developing countries (e.g., SIDS) will be considered in the formulation of the different articles and provisions of the draft Energy Act.

GEF support is required for the technical assistance in the formulation of the proposed Energy Act.

48. Activity 1.1.4: Public Consultations and Review of the Energy Act – This will involve the public review of the proposed Energy Act. The draft Energy Act will be disseminated to the various target groups for their comments and recommendations. Specific groups, particularly in the private sector among which are the prospective RE-based power generation project developers and investors will be consulted to solicit their comments and suggestion on the draft Act.

GEF support is required for the consultation meetings with the private sector in getting their comments and inputs to the draft Energy Act.

49. Activity 1.1.5: Consultations and Advocacy Campaigns on the Promotion and Support of Energy Act – This will entail the organization and conduct of an advocacy campaign program for the Fijian citizenry, in general, and GOF authorities, in particular. The program will involve the production of print, audio and visual media materials, holding of public discussion forums, and where necessary special discussion meetings with parliamentarians.

GEF support is required for the design and implementation of the advocacy campaign program, including expenses for the production and dissemination of promotional materials.

50. Activity 1.1.6: Submission to Cabinet for Approval and Promulgation of the Energy Act – This will entail the finalization of the Energy Act document for submission to Cabinet. Where necessary, assistance will be provided to the Energy Act proponents to ensure the approval and promulgation of the Energy Act by the Cabinet.

GEF support is required for the TA in the finalization of the Energy Act.

Output 1.2: Enforced Implementing Rules and Regulations (IRRs) for the Fiji Energy Act

51. The delivery of this output will involve the preparation of regulatory framework (rules and regulations for the implementation of the Energy Act), consultations on completed regulatory framework, and submission of the proposed IRR to Cabinet for approval. Relevant indicators of success include the enforcement of specific IRRs and revised IRRs proposed to enhance the Energy Act implementation by December 2013.

52. Activity 1.2.1: Preparation of Regulatory Framework - The formulation of the energy regulatory framework will involve the setting up of rules and regulations for the implementation of the Energy Act. In preparation for this work, a study will be undertaken involving research, review and adoption of certain existing rules and regulations in Fiji.

Comparisons with other countries' Regulatory Frameworks will be made and whatever aspects are deemed feasible, acceptable and necessary in the Fijian context will be incorporated into the draft energy regulatory framework.

GEF support is required for the technical assistance in the conduct of the study.

53. Activity 1.2.2: Consultations on and Finalization of the Regulatory Framework – The draft regulatory framework from Activity 1.2.1 will be presented and discussed with relevant stakeholders through one-on-one consultations and discussion fora to consolidate comments and suggestions on the draft regulatory framework. Consultations will be undertaken up to three times to ensure that all parties' interests are captured and taken into consideration in the finalization of the implementing rules and regulations (IRRs).

GEF support is required for the technical assistance in the stakeholder consultations.

54. Activity 1.2.3: Submission and Approval of the Proposed IRRs to Cabinet – This activity involves the implementation of actions (e.g., advocacy campaigns and lobbying) to ensure the approval of the formulated IRRs by the Cabinet. Liaison work with relevant government agencies (particularly FDoE) (and maybe pertinent private sector entities too) will be carried out to secure their support for the approval of the IRRs.

GEF support is required for the consultation with concerned parties.

55. Activity 1.2.4: Assistance on the Implementation of the Cabinet-approved IRRs – This activity involves the promotion and socialization of the cabinet-approved IRRs through specially organized campaigns. Guidelines on the IRR and their enforcement will be prepared and disseminated to the public (particularly to the local power project developers and other private sector entities that are interested in Fiji's national electrification activities).

GEF support is required for the technical assistance in the promotion, socialization and implementation of Cabinet-approved IRRs.

Output 1.3: Relevant GOF agencies with enhanced regulatory and institutional capacity on energy development, in general, and RE development in particular

56. This output will be delivered through the implementation of activities that include training needs assessment, development of partnership with an established international regulating agency and implementation including on-the-job attachments. Among the indicators of success include the establishment of RE regulations and legal frameworks administered by DOE senior staff for IPP projects and rural electrification by December 2013; and, 100% of approved RE-based power generation projects that are fully-compliant with DOE-administered RE regulatory and legal frameworks by December 2013.

57. Activity 1.3.1: Training Needs Assessment – This activity will include identification of personnel involved with energy development in various government agencies, and the assessment of their capabilities in handling or dealing with energy development in general. The assessments will be carried out in the form of interviews and consultations and also review of performances in meeting targets outlined in Annual Corporate Plans. Based on what has been gathered from the interviews and meetings, the gaps with respect to the capabilities will be identified. These gaps will be filled in Training Needs Assessment Forms which lists down the various training needs of staff.

GEF support is required for the technical assistance on training needs assessments.

58. Activity 1.3.2: Partnerships Development with Established International Regulating Agencies – This activity includes research and consultations with established international regulating agencies on Energy Planning in other developing countries and identifying one in which partnerships could be developed to enhance regulatory and institutional capacity of relevant government agencies. Upon identification of relevant agency, visits and associated meetings will be conducted to ensure that all aspects related to development of partnership are met and well established. Furthermore, a training program on energy planning will be developed for the training of staff from different government agencies.

GEF support is required for the technical assistance on the research on energy regulations, as well as in the design and conduct of the training program.

59. Activity 1.3.3: Conduct of On-the-Job Attachments Program – This activity involves the attachment of selected personnel from different government agencies at the partner International Regulating Agency (as identified in Activity 1.3.2). This is to enhance the local personnel' regulatory and institutional capacities on Energy Planning matters. Based on the training program developed in Activity 1.3.2, the On-the-Job attachment will help address barriers or gaps identified in Activity 1.3.1. The selected personnel on the attachment program are expected to gain experience on dealing with different matters related to integrated energy planning, ranging from performing energy balances, formulation of energy policies, rules and regulations to enforcement of energy policies & regulations, and energy policy impact analysis.

GEF support is required for the technical assistance in the design of the attachment program, and for the attachment/training program expenses.

60. Activity 1.3.4: Capacity Development Program Assessment – This activity involves the assessment of the effectiveness of the program for enhancing the regulatory and institutional capacity development for the GOF in the area of energy. It will also come up with relevant recommendations for future continuing training program on regulatory (including policy making) and institutional capacity building after the FREPP. After each training (including the on-the-job attachments), the trainees will evaluate the quality of the training provided. The training experts will evaluate trainee preparation for the training, and knowledge/skills uptake. The evaluation is expected to provide useful feedback in the design of similar training programs in the future. The impact of this activity will be assessed through post training surveys that will be carried out to determine how the recipients of the training are utilizing the knowledge and skills that they learned in their respective work in energy development & utilization.

GEF support is required for the technical assistance in the design and evaluation of the training course, including the cost for the implementation.

Component 2: RE Resource and RE-based Project Assessments

61. This component of the FREPP will address the technical and information barriers pertaining to the availability and technical feasibility of harnessing the country's RE resources, particularly mini/micro hydro, wind, geothermal, and biomass. This will be through the delivery of the following outputs: (a) established centralized clearing-house mechanism for repository of RE data; (b) completed and published RE resource assessment results; and, (c) completed feasibility assessments of RE investments. The outcome from this project

component is more energy projects on the utilization of confirmed viable RE resources are planned and implemented. The expected outputs that will help realize this outcome are as follows:

Output 2.1: Operational Centralized Energy Database System

62. This output will be delivered through the implementation of the following activities: identification and collection of existing data and information on RE work in Fiji, establishment of a Central Energy Database System and design and introduction of Dataflow System. Indicators highlighting success of realizing this output are quantitative and qualitative in nature such as: (a) increase in number of clients that request services from the central clearinghouse for RE-based energy systems project from zero to 300; (b) increase in number of clients that make use of central energy database system each year from zero to 150; (c) percentage increase of clients each year that are satisfied with the services received through the clearinghouse and central energy database system from zero to 80%; and, (d) increase in number of implemented RE-based power generation projects that were facilitated by the central clearing house system from zero to 20.
63. Activity 2.1.1: Identification and Collection of Existing Data and Information – This activity will involve the collection of existing data on energy development in Fiji. The data collection will be carried out through surveys and researches on actual monitored data of different renewable energy resources in Fiji. These data will be collected from all relevant government agencies, FEA, the private sector and other development partners. The gathered data will be verified, digitized and stored for ease of dissemination.

GEF support is required for the technical assistance in the surveys and in the data verification and processing.

64. Activity 2.1.2: Establishment of a Central Energy Database System – This activity will involve the establishment of a database system to store energy data collated in Activity 2.1.1. The database will allow systematic updates of data and information for dissemination to interested parties. The central energy database will be designed, specifying relevant fields and data modules to allow complete and proper data banking. The database will be developed and established in FDoE, which will be the administrator of the database and will be responsible for its upkeep. User manuals will be prepared. Training will be provided to the pertinent FDoE personnel in the database management and maintenance, as well as in its proper use.

GEF support is required for the technical assistance in the design, management and maintenance of the database, including purchase of software and hardware for the database operation.

65. Activity 2.1.3: Design and Introduction of Dataflow System – In operating the database, regular updates will have to be undertaken to ensure that information is up-to-date and that data is always available and easy to access. In ensuring that this is done, a protocol will be developed for data provision by relevant government agencies, FEA, the private sector and development partners as well as access by interested parties. This will be undertaken in the form of MOUs outlining different tasks to be undertaken by different parties including times in which data is to be provided.

GEF support is required for the technical assistance in the design, operation and maintenance of the dataflow system.

Output 2.2: Completed and published RE resource assessments

66. The activities to deliver this output includes: (a) an assessment of run-of-river type hydro potentials; (b) remote-sensing survey for geothermal power at selected sites; (c) resource assessment of waste-to-energy (waste energy and landfill gas); and, (d) resource assessment of solar thermal potential. Among the indicators of success include: (a) increase in number of comprehensive RE resource assessments completed from zero to 12; (b) average percentage increase in currently known RE potentials that was established after the RE resource assessments by December 2013; and, (c) increase in number of investors that made use of the RE resource assessment data/information in the design of their RE-based power generation projects from zero to six.

67. Activity 2.2.1: Assessment of Run-of-River type Hydro Potentials – This activity will involve undertaking hydro surveys at potential sites followed by long-term monitoring with periodic downloads for a period of one and a half to two years. Upon confirmation of feasibility of sites through analysis of monitoring data, tender works will be undertaken for a company to undertake detailed designing of feasible sites.

GEF support is required for the technical assistance in the conduct of survey and monitoring of potential hydro resource sites.

68. Activity 2.2.2: Remote-sensing Survey for Geothermal Energy – This activity will involve liaising with Mineral Resources Department (MRD) for the survey of geothermal potential sites. In doing so, information on potential geothermal sites will be obtained from the MRD and verified. Following this, discussions will be made with MRD on how to undertake remote-sensing survey and a MOU will be drafted and finalized outlining specific roles of all parties involved and actual survey works to be undertaken. Once the MOU is finalized and all existing information verified, the remote sensing survey will be undertaken.

GEF support is required for the technical assistance in the conduct of the remote sensing surveys.

69. Activity 2.2.3: Resource Assessment of Waste-to-Energy – In carrying out this activity, existing information on the quantity and quality of waste that are available for use as energy source will be gathered and collated from different government agencies and private companies. These data will be verified and updated through consultations with relevant stakeholders and conduct of site surveys. The surveys will be conducted in sites where waste-to-energy technologies can be implemented. The verified and updated will be presented and discussed through consultations with relevant stakeholders. Thereafter the report on the waste-to-energy resource assessments will be prepared. Once the waste-to-energy potentials have been ascertained, research will be carried out on appropriate waste-to-energy technology or equipment that can be applied.

GEF support is required for the technical assistance in the data gathering, processing, and updating.

70. Activity 2.2.4: Resource Assessment of Solar Power Generation Potential – The focus of this activity is on the identification of feasible sites for harnessing solar energy for power generation, using data obtained from relevant stakeholders, in particular Fiji Meteorological Services. Upon identification of feasible sites, surveys and monitoring of the pertinent solar energy parameters will be carried out at these sites to establish the power generation capacity and ascertain the technical and economic feasibilities of the potential solar power generation.

Analysis of monitoring data will be carried out followed by preparation of site feasibility reports.

GEF support is required for the technical assistance in the data gathering and techno-economic feasibility analyses.

Output 2.3: Completed feasibility assessments of renewable energy investments

71. This output will be delivered through the review of existing feasibility studies done on RE-based power generation projects; convening of feasibility studies for priority RE-based power generation projects; and, publishing the results of the review and new feasibility studies. Success will be measured by relevant indicators such as: (a) increase in number of completed and published new feasibility studies of IPP investments from zero to six; (b) increase in number of planned new feasibility analyses to be carried out (after FREPP) from zero to four; and, (c) percentage increase of interested investors in Fiji that expressed confidence in the technical and financial viabilities of RE-based power generation projects from zero to 30%.
72. Activity 2.3.1: Review of Existing RE Project Feasibility Studies – In undertaking this activity, existing reports on RE project feasibility studies will be gathered from relevant stakeholders. Depending on date in which reports were published, the reports will be reviewed and updated through consultations with the relevant stakeholders. A report on the results of the review will be prepared, incorporating consolidated comments and recommendations from the stakeholders.

GEF support is required for technical assistance in the review of, and consultations regarding, the feasibility studies.

73. Activity 2.3.2: Conduct of Comprehensive Feasibility Studies for Priority RE Projects - This activity will involve the selection and prioritization of potential RE-based power generation projects (government-funded and/or private sector-funded) that can be endorsed. The prioritization will be based on a set criteria that will include, among others, the extent of global (in terms of GHG emission reduction) and national/local (in terms of fossil fuel displacement, economic returns, income generation potentials, pollution reduction, etc.) benefits. The prioritized projects will be incorporated in the new National Electrification Master Plan, which will be developed in Activities 4.2.1 – 4.2.4 by the trained personnel in Activities 1.33 and 1.34. The results of the comprehensive feasibility studies will be disseminated to interested power project developers and investors.

GEF support is required for the technical assistance in the conduct of the feasibility studies.

Component 3: RE-based Power Generation Demonstrations

74. This project component is intended as an attempt to contribute to the re-establishment of the RE market in Fiji. Previous solar energy projects of the FDOE in the early part of this decade have spurred growth in the application of RE technologies in the country, particularly solar home systems. Presently, some efforts are being made on significant RET application projects in the country. The envisioned approach to achieve this is to showcase strategically important RE-based power generation applications with combined co-financing from government and private sector. The demonstration program is not meant only for showing the applied RE technology in the operation of an installed on-grid RE-based power generation facility, but also the entire aspect of planning, design, engineering, financing, installation, and management arrangements of the installed facility and their support systems. From this

approach, the expected outcome from this project component is a revitalized RE market in Fiji. Hence, the expected outputs from this component that will contribute to the realization of the expected outcome are as follows:

Output 3.1: Designed and implemented RE-based power generation demonstration

75. There will be two major demonstrations that will be carried out for showcasing the design, engineering, planning, financing, implementation, operation and maintenance of on-grid RE-based power generation. The following activities will be carried out in order to deliver the expected outputs: (a) promotion of the demonstration schemes; (b) evaluation and confirmation of the demo projects; (c) baseline data establishment for the demo projects; (d) facilitation of the requirements for the installation of the demonstration projects; (e) provision of technical assistance (if needed) in securing the financing for the demo projects; (f) demonstration results evaluation, documentation and dissemination; (g) capacity building for local engineering and consulting firms on the design, installation, and maintenance of RE-based power generation systems; and, (h) design of a sustainable follow-up program for financially supporting future RE-based (including biomass) power generation in Fiji.
76. Activity 3.1.1: Promotion of the Demonstration Schemes – This activity includes building partnerships with IPPs, investors and consumer groups on the promotion of planned FREPP demonstrations, with the idea of getting their support in promoting RE-based power generation and if necessary soliciting their agreement to host the replications of the demos after FREPP. Two demonstrations have already been identified, and agreements for hosting these projects have already been prepared. It is however, necessary to have other companies to host the demo replications. In undertaking this, consultations will be made with the IPPs to discuss ways in which partnerships on the promotion of the demonstrations and hosting the replications could be developed with the government. Agreements on the hosting of replication projects are expected to be signed from the actions that will be carried out under this activity.

GEF support is required for any technical assistance needed in the promotion of the demonstration schemes. Concerning the medium scale grid connected biomass-fired power plant demonstration project this would include support to required community consultations.

77. Activity 3.1.2: Evaluation and Confirmation of the Demonstrations – This activity will focus on the conduct of comprehensive techno-economic feasibility analysis of the selected demonstrations. There will be two demonstrations to be implemented: (1) Grid connected biomass-based power generation plant; and, (2) Small scale mini-grid biodiesel power generation plant. These two demonstrations are expected to achieve a combined CO₂ emission reduction of about 170 ktons (based on 10 years operations). Surveys of the project sites and consultation meetings with the owners of these two projects will be carried out, and together with the project owners, a comprehensive techno-economic feasibility analyses will be carried out. Alternatively, a review of the techno-economic feasibility of each project by the project owners will be reviewed to confirm the viability of both projects, making them suitable for demonstration under the FREPP.

GEF support is required for the technical assistance in the comprehensive feasibility evaluation of the demonstrations.

78. Activity 3.1.3: Baseline Data Establishment for the Demonstrations – For this activity, surveys will be undertaken to determine baseline data on specific power generation performance parameters, as well as information on quantity of supply of RE resources,

expected annual generation, reduction in GHG emissions, power generation cost if the project is not implemented, current socio-economic conditions in the area where the project will be implemented, etc. Discussions will be made with the demo hosts regarding the baseline data to seek agreement on these. The agreed baseline data will be used for the evaluation of the energy, economic and environmental performances of the demonstrations. A monitoring and evaluation scheme will be developed. Once approved by the demo hosts and project stakeholders, this will be used for the performance evaluation of the demo projects.

GEF support is required for the technical assistance in the baseline data establishment, and in the monitoring & evaluation scheme development. Concerning the medium scale grid connected biomass-fired power plant demonstration project this would include support to surveys and research on power generation performance parameters, supply of renewable energy resources, and socio-economic conditions in targeted communities.

79. Activity 3.1.4: Design and Engineering of the Demonstrations - This activity will mainly be carried out by the demonstration hosts. If needed, technical assistance in the preparation basic engineering design will be provided, as well as in the detailed engineering designs.

GEF support is required for the technical assistance in the basic and detailed engineering designs.

80. Activity 3.1.5: Facilitation of the Requirements for the Installation of the Demonstrations – The activity will include land acquisition for demonstration projects, EIA reports for effects on the environment, discussions and meetings with landowners on project, procurement of equipment for demo projects. All these will be undertaken through consultations with stakeholders including land owners. Based on surveys and stakeholder discussions, separate reports will be prepared on EIA, acquisition of land and so on. These reports will be beneficial later on should the need arise for queries related to the projects.

GEF support is required for the technical assistance in the facilitation of the demonstration project implementation. Concerning the medium scale grid connected biomass-fired power plant demonstration project this would include support to consultations on required land acquisition.

81. Activity 3.1.6: Installation and Operation of each Demonstration Project - The main tasks under this major activity for each demonstration project will be similar to that in full project implementations, starting from the conceptual design, to feasibility study, engineering design, installation, operation, monitoring and evaluation. Technical assistance will also be provided in the installation and commissioning works. Each demo project will be regularly monitored by the host and the FREPP project personnel using the common M&E scheme developed in Activity 3.1.3.

GEF support is required for the technical assistance in the installation, operation and monitoring of the demonstration projects.

82. Activity 3.1.7: Demonstrations Results Evaluation, Documentation and Dissemination – This activity involves the preparation of the project profile (as case studies) of each demonstration. An inventory of the demonstration project results will be made. Each demonstration project report will be summarized into project profiles (or case studies) following an agreed presentation format. A workshop will be organized and conducted to discuss the results of the demonstration projects. The demonstration hosts will present the demonstration project they have implemented highlighting the RE-based power generation technology involved, the

scheme, the investment involved, results, energy savings achieved, actual project economics, estimated GHG emission reductions, and their respective recommendations for RE-based power generation in Fiji. The workshop will also assess the overall performance of the demonstration program. The workshop proceedings will be documented and published for dissemination.

GEF support is required for the technical assistance in the evaluation and documentation of the demonstration performance, including conduct of the workshop and in the publication and dissemination of the workshop proceedings. Concerning the medium scale grid connected biomass-fired power plant demonstration project this would include support to build capacity for on-going monitoring.

83. Activity 3.1.8: Capacity Building for Local Engineering and Consulting Firms on the Design, Installation, and Maintenance of RE-based Power Generation Systems – This activity will involve the conduct of a survey will be conducted to determine and evaluate the current level of capacity of the local technical service providers (e.g., engineering firms/consultants, power system repair & maintenance companies) to design, engineer, install, operate and maintain RE-based power generation systems. The results of the assessment will be used for classifying the existing service providers, and also for designing a training program for improving their knowledge and skills on RE-based power generation systems, as well as in the provision of technical assistance. A training course on RE technology will be designed, prepared, organized, and implemented. The training materials will be prepared by experts that will be engaged, and will be based on the results of the capacity needs assessment that will be carried out. After the training course, an assessment of its effectiveness will be conducted to come up with relevant recommendations for future continuing training program on RE system design, engineering and maintenance after FREPP. The trainees will evaluate the quality of the training provided. Also, the training experts will evaluate trainee preparation for the training, and knowledge/skills uptake. The evaluations are expected to provide useful feedback in the design of similar training programs in the future. As part of the impact analysis of this activity, post training surveys will be carried out to determine how the recipients of the training are utilizing the knowledge and skills that they learned in their respective work in the RE market in Fiji.

GEF support is required for the necessary technical assistance in the design, implementation and evaluation of the training program.

84. Activity 3.1.9: Design of a Sustainable Follow-up Program for Financially Supporting Future RE-based Power Generation in Fiji – This activity will involve planning and strategizing for a follow-up program for promoting RE-based power generation in Fiji. An Action Plan and Resource Mobilization Strategy for future funding of the prioritized projects in Activity 2.3.2. The Action Plan will include the follow-up of the demonstration program, aiming for replication of the demos by interested power project developers and investors. .

GEF support is required for the documentation, publication and convening of donor-round table meetings.

85. The project partners (i.e., demonstration hosts – Government of Fiji and **Vara Renewable Energy**) will be responsible for the: (1) detailed engineering design of the demo projects; (2) purchase and installation of the hardware required for the demos; (3) commissioning, operation and performance monitoring of the demo facility; and (4) reporting of the performance monitoring results.

86. Indicators of success of realizing the delivery of this output include an increase in overall installed capacity of RE-based power generation demonstration projects from zero to 3 MW; increase in number of demonstration projects that are both operationally and financially viable from zero to 10; increase in number of planned RE-based power generation projects that are replicating any of the demonstration projects from one to 16; and, increase in total installed capacity of replication RE-based power generation projects from zero to 30.

Output 3.2: Standard Power Purchase Agreement (PPA) for IPPs

87. This will include a review of existing PPAs, drafting of a standardized PPA and promotion of the developed standardized PPA format. Among the indicators of success are: endorsed Standard Power Purchase Agreement (SPPA) template that is used for IPP projects in Fiji, and increase in number of IPP RE-based power projects that made use of any of the approved SPPA templates by December 2013 from zero to six.
88. Activity 3.2.1: Review of Existing PPAs – Existing PPAs of power producers in Fiji will be gathered and reviewed. The review results will be discussed with key stakeholders, particularly the FDOE, IPPs and FEA. The review will focus on specific items/articles that have been considered critical issues that need to be addressed in order to encourage IPPs and other private entities interested in the power generation business to seriously consider RE-power generation in Fiji. A report will be compiled based on the review and comments/suggestions of the stakeholders.

GEF support is required for the technical assistance in the review of existing PPAs.

89. Activity 3.2.2: Development of a Standardized PPA Format – This activity is a continuation of Activity 3.2.1. Once stakeholders are satisfied with the review recommendations, a standardized PPA format will be formulated. Consultation meetings with the relevant stakeholders (FDOE, IPPs and private entrepreneurs and FEA) will be carried out to discuss the suggested format and for them to provide recommendations. With the endorsement of the stakeholders, the standardized PPA format/template will be finalized. The standardized format will be promoted to all IPPs and private entities interested in the power generation business in Fiji.

GEF support is required for technical assistance in the formulation of a standardized PPA format/template.

Output 3.3: Completed Investment Promotion Package

90. Activities that will be carried out to deliver this output includes preparation of a list of investment opportunities, relevant information packages, publications and the convening of an investors' forum. The success of this output will be measured by corresponding indicators and targets that include: (a) an increase in the number of prospective investors making enquiries with government agencies from zero to 15; and, (b) cumulative number of investors that expressed and planned to invest & implement RE-based power generation projects by December 2013 from zero to 10.
91. Activity 3.3.1: Review and Listing of Bankable Investment Opportunities – This activity will involve the review existing Bankable Investment Opportunities to determine the prospects and incentives for power generation projects, in general, and RE-based power generation projects, in particular. RE-based power. In addition, discussions and meeting will be held

with stakeholders and government agencies followed by a report on the review and also listing of Bankable Investment Opportunities.

GEF support is required for the technical assistance in the review exercise.

92. Activity 3.3.2: Preparation of Investment Information Packages and Publications – This activity will involve the preparation of Investment Information Packages and Publications for RE-based power generation projects. The basis for these is the review that is carried out in Activity 3.3.1. The finalization of the packages/publications will be based on the comments and recommendations from stakeholder consultations that will be carried out for this purpose.

GEF support is required for technical assistance in the design of Investment Information Packages and Publications.

93. Activity 3.3.3: Organization and Conduct of an Investors' Forum – Expressions of Interests (EOI) will be published on various media (such as TV, DOE website, radio and newspapers) for participation in an Investors' Forum, Convening of Investors' Forum where intensive discussions will be made on RE Investments in Fiji, identification of interested IPPs, registering of new IPPs, and compilation of report on Forum.

GEF support is required for technical assistance in the organization and conduct of the investors' forum

Output 3.4: Completed assessment and developed RE incentives schemes

94. This output will be delivered through the implementation of activities, which include the review of existing subsidies and incentive schemes in Fiji fund together with a review of international experiences of similar nature. The success indicator for this output is the published comprehensive report on options and issues related to the establishment of a subsidy fund for private sector renewable energy investment by June 2012.

95. Activity 3.4.1: Review of Existing Subsidy and Incentive Schemes in Fiji – This activity will involve the review of the existing subsidy and incentive schemes in Fiji. Relevant information on existing subsidy and incentive schemes from various sources will be gathered through consultations with relevant stakeholders. Once existing information have been collated, these will then all be reviewed to determine and assess possible options for providing financial or fiscal incentives (and the schemes to implement them) for potential investors in RE-based power generation in Fiji. The review will determine the most appropriate baseline scheme (or a combination of schemes) for the envisioned incentive schemes, as well as the latest international literature and experience on similar financial mechanisms for RE-based power generation investments. The assessment will also determine how much financing is currently being extended to RE projects by private financing institutions. An evaluation of the viability of financing RE-based power generation projects, as well as the assessment of potential financing schemes (including the prevailing terms and conditions), will be carried out. A report on the results of the review will be compiled accordingly.

GEF support is required for the technical assistance in the review and formulation of incentive schemes.

96. Activity 3.4.2: Review of International Experiences in the Development and Implementation of RE Subsidy and Incentive Schemes – This activity will be a continuation of Activity 3.4.1 and will involve researching on incentive schemes and experiences on the implementation of

these in other countries and adopting whatever is/are suited to Fiji's needs. A report stating the good practices and feasible schemes (in the context of Fiji) will be prepared.

GEF support is required for the technical assistance in the review.

97. Activity 3.4.3: Preparation, Publication & Dissemination of Review Report – The report that will be produced in Activity 3.4.2 will be presented either in a workshop or a stakeholders' consultation meeting. Comments and suggestions will be solicited, which will be taken into consideration in the design of the suitable incentives scheme.
98. Activity 3.4.4: Design of Incentive Schemes for RE-based Power Generation Projects - This activity is targeted to assist potential RE power generation project developers/owners. Technical assistance will be provided in the design of appropriate incentive schemes for such projects, based on available financial sources like government grants, and maybe loans from financial intermediaries. The identification and assessment of sources of finance, tariff structures and fiscal aspects will also be covered. This activity will also involve the development of the eligibility criteria for availing of the incentive scheme(s).

GEF support is needed both for the technical assistance in the design of the recommended incentive schemes.

Component 4: RE Institutional Strengthening

99. This component addresses the need to further enhance the capacity of the FDOE and the energy sector in integrated energy planning. A particular focus of this is the preparation of a definitive master plan for the electrification of the country. Such plan is meant to be an environmentally friendly, sustainable and least cost power expansion plan for the country covering both the provision of increased access by people in the present un-electrified areas to grid and mini-grid based power, as well as addressing the increased demand for power from already electrified areas (among others to ensure that power developments keep pace with population growth). The outcome from this project component is the integration of RE development and utilization in the national energy planning with a view of 100% electrification of the country. This outcome will be realized through the following outputs:

Output 4.1: Completed training programme on integrated energy planning (IEP) and administrative energy policy for government personnel

100. Activities that will be implemented to produce this deliverable include assessment of training needs, followed by the design of a relevant training programme. Once approved, implementation of the training programme will be done in cooperation with established training institutions in Fiji. Success of this output will be indicated by: (a) increase in number of government personnel trained on IEP and energy policy each year from two to six starting Year 2011; (b) percentage increase of trained GOF personnel that are actively engaged in RE-based power generation policy making, planning and implementation, operations and evaluation from zero to 50%; and, (c) assistance provided to two existing institutions that are capable and qualified in IEP and energy policy training/capacity building.
101. Activity 4.1.1: Assessment of Training Needs on IEP – This activity will include identification of personnel involved in energy policy making and planning in various government agencies, and the assessment of their capabilities in these two aspects of energy development in general. The assessments will be carried out in the form of interviews and

consultations and also review of performances in meeting targets outlined in Annual Corporate Plans. Based on what has been gathered from the interviews and meetings, the gaps with respect to the capabilities will be identified. These gaps will be filled in Training Needs Assessment Forms which lists down the various training needs of staff.

GEF support is required for the technical assistance on training needs assessments.

102. Activity 4.1.2: Design, Conduct and Evaluation of IEP Training Program – The results of the assessment in Activity 4.1.1 will be used for classifying the existing service providers, and also for designing a training program for improving their knowledge and skills on IEP. A training course on IEP will be designed, prepared, organized, and implemented. The training materials will be prepared by experts that will be engaged, and will be based on the results of the capacity needs assessment that will be carried out. After the training course, an assessment of its effectiveness will be conducted to come up with relevant recommendations for future continuing training program IEP after FREPP. The trainees will evaluate the quality of the training provided. Also, the training experts will evaluate trainee preparation for the training, and knowledge/skills uptake. The evaluations are expected to provide useful feedback in the design of similar training programs in the future. As part of the impact analysis of this activity, post training surveys will be carried out to determine how the recipients of the training are utilizing the knowledge and skills that they learned in their respective work in energy development in Fiji.

GEF support is required for the necessary technical assistance in the design, implementation and evaluation of the training program.

Output 4.2: Completed and approved National Electrification Master Plan

103. The delivery of this output will involve the development of a National Electrification Master Plan and identification of sources of finance for its implementation, and submission of the Plan for Cabinet approval. The success indicators include the: (a) Cabinet approved-Electrification Master plan by 2013; and, (b) approved annual budget of US\$10 million for the Electrification Master Plan.
104. Activity 4.2.1: Development of an Electrification Master Plan – This activity will involve the provision of technical assistance to the GoF in integrated national electrification master planning. A review of previous and existing electrification plans will be carried out to determine, among others, the specific plan items that were realized and not realized. Reasons for the non-realization of planned items will be determined and evaluated and the review results will be taken into consideration in the development of the new master plan. Based on available reports on electricity demand forecasts, and the identified prioritized actions and projects in Fiji's Second National Communications to the UNFCCC, as well as those prioritized under Activity 2.3.2 the expansion of electrification in the country will be revised/updated. Least cost planning, using appropriate software, geographical information systems, energy and socio-economic statistics, aerial maps and meteorological data will be carried out in the formulation of the National Electrification Master Plan (NEMP) of Fiji.
105. As in other planning activities, the draft plan will be reviewed and commented on by the relevant stakeholders in government and the private sector. Based on the comments and recommendations from the stakeholders' consultations, the NEMP will be finalized and submitted to the relevant GOF agency for approval.

GEF support is required for the technical assistance in the development and documentation of the Electrification Master Plan.

106. Activity 4.2.2: Presentation and Lobbying for Approval, and Finalization of the NEMP – Advocacy and lobbying work will be carried out (if necessary) in order to secure the approval of the NEMP. Assistance will be provided to the FDOE in facilitating the approval of the NEMP. To facilitate the administrative aspects of the NEMP implementation, a training program for the FDOE on the implementation and evaluation of electrification master plans will be designed and conducted. This will include training on the evaluation of NEMP plan implementation as well as proposed RE-based power generation projects (aside from those in the NEMP) that are for permits and approvals.

GEF support is required for the technical assistance in the promotion and advocacy campaigns for the Master Plan, as well as in the training on plan implementation and evaluation.

107. Activity 4.2.3: Finalization and Submission of the NEMP Plan for Cabinet Approval – This activity will entail the finalization of the NEMP document for submission to Cabinet. Where necessary, assistance will be provided to the FDOE to ensure the approval of the NEMP by the Cabinet, thereby making way for the NEMP implementation.

GEF support is required for the technical assistance in the finalization of the Master Plan.

108. Activity 4.2.4: Identification of Potential Financing Sources for NEMP Implementation – With the approval of the NEMP, work will be carried out to facilitate its implementation. This activity will involve the promotion of the NEMP both to domestic and foreign investors. This entails the organization and conduct of a promotional campaign for the funding and implementation of specific projects endorsed and described in the NEMP. The promotional campaign will also cover other countries that provide bilateral aid in the Pacific region, as well as multi-lateral donors.

GEF support is required for the technical assistance in the organization and the logistical requirements for the implementation of the promotional campaign.

Key indicators, risks and assumptions

Key Indicators

109. The project success indicators are shown in the Project Planning Matrix (PPM) in Section III of this document. These form part of the parameters that will be monitored during the course of the FREPP implementation. The target values for these indicators, based on the PPM, are summarized in Section III. However, the key indicators are the following:

Table 6: Key Project Indicators and Targets

Indicator	Target	
	End-of-Project	10 Years after End-of-Project
Cumulative investment on RE-based power generation, US\$ million	100	300
Number of identified technical viable RE projects	6	10

Indicator	Target	
	End-of-Project	10 Years after End-of-Project
Number of investors that made use of available technical information on feasible RE-based energy system projects	20	50
No. of IPP projects using the Standardized PPA Format	6	5
Number of additional rural households that have access to green electricity	10,000	10,000
Number of financial closures achieved for new RE-based power generation projects	20	5
Number of RET systems equipment/component suppliers & distributors in Fiji by EOP	5	8
Overall volume of business in the RE market in Fiji, US\$ million	100	200
Average annual budget for Master Plan, US\$ million	10	20
Percentage utilization of Fiji's RE resources, %	90	95

Risks:

110. The key risks for the project include ineffective project management, limited recognition and commitment of the government, political change, failure of some of the demonstration projects due to operational and environmental factors, and lower oil prices. These risks including the proposed mitigation measures for each are summarized in Annex 1. Note that the risk related to the impacts of climate change on the amount of precipitation and thus the output of hydro power is not included in Annex 1 inasmuch as that risk is considered low. Moreover, FEA and IPPs, which operate most of the existing and planned hydropower projects in Fiji has taken (in the case of existing facilities) and will take into, consideration the necessary mitigation actions should there be threats from potential climate changes, which at the moment are gauged as low level risks. Nonetheless, the impacts of climate change and climate variability are something that the proposed additional RE resource assessments on Component 2 of this project will also determine⁸.

Assumptions:

111. The successful implementation and achievement of expected outcomes of this project is anchored on the following assumptions:

- Fiji's investment climate does not deteriorate further, i.e., political stability is maintained and government is able to take on additional contingent liabilities.
- FEA is not privatized (sold) completely and cooperates in an effort to mobilize private sector capital. FEA's complete privatization will make it difficult to remove the monopoly status that exists within the sector, and thus IPPs will not be able to actively participate in a market-based situation.

⁸ As to the other risk mitigation strategies, these include: (i) Communities and national level stakeholders to look into managing water supplies to plan for anticipated seasonal shifts in hydroelectric supply and demand; (ii) additional hydroelectric power transmission systems to be built to connect areas expected to be water-rich to areas that could be more drought-prone; and, (iii) most importantly perhaps, Fiji can diversify its energy mix to protect against the shortfall of any single energy source including in this case hydropower. On the latter risk mitigation strategy, diversification is something Fiji has been working on over the last many years. In the Fiji National Energy Policy (2006) there are four key strategic areas one of which is energy security. Specific policies for Fiji in this area are as follows: (i) promote the development of indigenous energy sources such as hydropower, geothermal, solar, wind and biomass; (ii) promote energy efficiency and energy conservation in all sectors; and, (iii) strengthen energy security and improve energy supply mix for the country.

- Political will exists to allow private sector investment in IPP, FEA remains a state owned utility, private sector investors perceive Fiji as viable destination and government ruling in other sectors does not undermine investors' confidence.
- The Government of Fiji recognizes the importance of the NEP in the achievement of the overall socio-economic, energy and environmental goals of the country and passes laws and programs to encourage participation from all sectors of the national economy. Demand for RE projects exists to sustain private and non-government sector investments and participation in the sector will continue.

Financial modality

112. The components of the proposed project consist of interventions that ultimately will augment and strengthen the capacity at the Government of Fiji to facilitate increased utilization of renewable energy resources for the provision of electricity-based energy services using modern efficient technologies. Most of these activities are necessary in making possible the current as well as planned initiatives of the country to expand its development and utilization of its RE resources for power generation. Hence, most of these are incremental activities that will help bring about global environmental benefits are derived from the displacement of fossil fuels used in power generation by RE resources.
113. The GEF funds will be used as grant to pay for technical assistance and capacity building activities to support the establishment of required policy reforms and regulations, undertake required resource monitoring and assessments, strengthen existing demonstration projects including through capacity development and prepare and initiate new ones that will assist strengthening the markets for specific RE technologies and ensure that required project management support is in place. GEF resources will not be used for direct investments.
114. As shown in Table 7, the total estimated cost of FREPP (excluding US\$ 25,000 for PPG) is US\$ 17,528,673. Out of this, costs for all incremental activities funded by GEF amount to US\$975,000. The Government of Fiji and Vara Renewable Energy (for which the latter's capital cost is worth US\$ 15m) will provide a combined total amount of US\$ 16,553,673 for implementing the project's baseline activities.

TABLE 7: PROJECT COSTS (US\$)

Project Component		Co-Financing	GEF	Total
#	Title			
1	Energy Policy & Regulatory Frameworks	50,000	150,000	200,000
2	RE Resource and RE-based Project Assessments	403,673	150,000	553,673
3	RE-based Power Generation Demonstrations	15,900,000	427,500	16,327,500
4	RE Institutional Strengthening	100,000	150,000	250,000
Project Management		100,000	97,500	197,500
Total		16,553,673	975,000	17,528,673

Cost-effectiveness

115. The project is based on an overall barrier removal approach. Since the uptake of RE-based power generation in Fiji is hindered by clear and generally well-understood barriers/constraints, addressing the removal of such barriers in a holistic and integrated manner will help facilitate the widespread utilization of the country's feasible RE resources including for sustainably meeting the country's target of 100% electrification. At the same time, such approach leads to a cost-effective way of contributing to the reduction of CO₂ emissions in the power sector. Compared to other approaches which address only case-by-

case specific aspects of individual RE-based power generation projects, an integrated approach of addressing the various overall and inter-related issues would bring about more benefits.

116. The proposed project, which is focused on the creation of the enabling environments that are supportive to the development and application of RE technologies in power generation, will mainly bring about indirect CO₂ emission reductions. However, the demonstrations that will be implemented under the project will result in CO₂ emission reductions that can be directly attributed to the project. One 3.2 MW biomass project and 20 biofuel power projects are expected to reduce CO₂ emissions by about 17 ktons⁹ annually. Conservatively estimating this annual amount throughout a period of 10 years (Lifetime of both projects is about 20 years), the total CO₂ emission reductions is approximately 170 ktons. This translates to a unit abatement cost (GEF\$/ton CO₂) of about US\$ 5.74/ton¹⁰. This measure of the project's cost effectiveness will be tracked using a monitoring and evaluation system that the FREPP will develop to quantify potential energy savings from the demonstration projects and projected replication.

Sustainability

117. The factors affecting the success and sustainability of FREPP include: (i) political, social and economic stability; (ii) conducive government policies; (iii) smooth and productive cooperation between and among key stakeholders directly involved in the implementation (government, private sector, FEA and regional organizations); and (iv) effective support from development partners. Even though Government endorsement was obtained during the PIF phase, achievement of FREPP's goal and sustainability of the overall initiative would depend on Government's willingness to put into practice the recommendations that will result from the implementation of FREPP.
118. The necessary support components such as capacity development and, availability of data and information to enhance sustainability will be built into the structure and respective activities of FREPP as summarized in Table 8 below.

Table 8: Ensuring Sustainability Post-FREPP

Dimensions of Sustainability	How will these be secured during Post-FREPP period?
Financial	The involvement of the private sector through investment in renewable energy will be enhanced through an environment that is conducive to sustain the operations with appropriate rate of returns.
Institutional	The anticipated Energy Act would set-up the required reforms and structures for an efficient and effective institutional set-up to manage and coordinate the energy sector. FREPP will develop capacity development programs that will be institutionalised into existing training institutions to provide continued RE-based training as part of its curriculum.
Policy	FREPP will bring-about an improved approach to energy sector activities through the formulation of an overarching framework, the Energy Act, including the necessary implementing rules and regulations.
Technical	The developed capacity development programme(s) with local training

⁹ This does not include the CO₂ emission reduction of about 3.3 ktons/year from diesel fuel displacement on account of the 40% biodiesel net production from the biofuel mill that will be sold and used as transport fuel.

¹⁰ Considering the CO₂ emission reduction from use of biodiesel produced from the biofuel mills for transport fuel, the unit abatement cost becomes US\$ 4.82/ton. See Annex C for the estimation of the CO₂ emission reductions attributable to FREPP. The estimation is based on the procedures specified in the Manual for Calculating GHG Benefits of GEF Projects, 2008.

	institutions will provide a continued avenue to train and maintain the required technical skills in renewable energy.
Environment and Social	The environment that is conducive to enhance the use of RE technologies will cushion any environmental impacts resulting from additional use of fossil fuel for power generation. In addition, the anticipated boost of IPPs will provide additional employment.

Replicability

119. The objective of this project is the removal of barriers to the widespread and cost-effective of grid-based renewable energy supply via commercially viable renewable energy technologies, which will assist sustaining socio-economic development particularly in the outer islands in Fiji. In addition, certain components of this project, such as Standard Power Purchase Agreement (PPA) for IPPs, have the potential for replication in the Pacific region. The baseline scenario of unabated GHG emissions from the energy sector of the country is a matter of significant concern for the Pacific Island Countries (PICs). This project will also contribute to the achievement of similar goals and objectives of the PICs that are working collectively under various sub-regional and regional RE programmes. Hence, successful efforts in Fiji can serve as a model (for best practice) for other PICs or SIDS elsewhere to follow. FREPP intends to proactively share and build awareness of affirmative policies, regulations and legislation on applicable RETs, whose adoption can lead to significant reduction in GHG emissions and at the same time meet national energy objectives.

3. PROJECT RESULTS FRAMEWORK:

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD: The mainstreaming of environmental sustainability and sustainable energy into regional and national policies, planning frameworks and programmes; and Pacific communities sustainably using their environment, natural resources and cultural heritage.					
Country Programme Outcome Indicators: # of national development strategies, policies, plans of PICs incorporating environmental sustainability issues, % increase in national budget for environmental sustainability issues.					
Primary applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): 1. Mainstreaming environment and energy OR					
2. Catalyzing environmental finance OR 3. Promote climate change adaptation OR 4. Expanding access to environmental and energy services for the poor.					
Applicable GEF Strategic Objective and Program: For Strategic Program 3 (SP-3): Promoting Market Approaches for Renewable Energy and Strategic Program 4: Promoting Sustainable Energy Production from Biomass					
Applicable GEF Expected Outcomes: For SP-3: growth in markets for renewable heat power in participating program countries; and for SP-4: the adoption of modern and sustainable practices in biomass production, conversion and use as energy					
Applicable GEF Outcome Indicators: For SP-3: tons of CO ₂ e avoided, the adoption of on-grid renewable policies, and the quantity of electricity generated from renewable sources; and for SP-4: tons of CO ₂ e avoided; the adoption of modern biomass conversion technologies, improved efficiency of biomass energy use, kWh of electricity and heat generated from biomass sources, and energy services produced on the basis of biomass					
Strategy	Indicator	Baseline	Targets	Source of verification	Risks and Assumptions
Goal Reduction of greenhouse gas emissions from Fiji's power sector.	Cumulative greenhouse gas emission reduction from power generation in Fiji by the end of project (EOP), ktons CO ₂	316.4	935.8 ¹¹	DoE Records, IPP power generation data, National Statistics, National Communications, FREPP progress reports and M&E reports	Transparency of decision making, cooperation of stakeholders in the provision of data, stable political environment
Project Objective ¹² Removal of major barriers to the widespread and cost-effective use of grid-based renewable energy supply via commercially viable renewable energy technologies	Cumulative installed new private sector-owned RE-based power generation capacity by EOP, MW	0 ¹³	4.7 ¹⁴	Survey of IPP investment activities (interviews with prospective investors, FTIB approvals, Financing documents from banks/financial institutions, FREPP progress reports and M&E reports, FEA Annual Reports, DOE Yearly Energy Statistics	Investors perceive current governance systems as conducive for doing business in Fiji. Fiji's sovereign risk can be managed through government guarantees.
	Share of RE in Fiji's power generation mix by EOP, %	52	89.0		
	Cumulative electricity production from RE-based power generation plants by EOP, GWh	494.0	1,505.1 ¹⁵		

¹¹ Minimum end-of-project CO₂ emission reduction from demonstrations only (3.2 MW VRE PP, and 25% of biofuel mills operational by EOP)

¹² Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR

¹³ Considering that FSC and Tropic Woods are not entirely IPPs.

¹⁴ This is minimum, taking consideration only of the 3.2 MW VRE biomass-based power plant and 5 x 300 kW diesel engines using biodiesel produced by 5 biofuel mills

¹⁵ This is minimum, taking consideration of baseline RE electricity + electricity generation only from VRE biomass-based PP and 5 biodiesel power generation units

OUTCOME 1 Facilitation of investments on energy projects, particularly on RE and biomass based power generation	Cumulative investment on RE-based power generation by EOP, US\$ million	0	100	Survey of IPP investment activities, interviews with prospective investors, FTIB approvals, Financing documents from banks/FIs, FREPP progress reports and M&E reports	Investment climate does not deteriorate further, political stability maintained, government able to take on additional contingent liabilities.
Output 1.1: Fiji Energy Act	No. of proposed articles on the Energy Bill that are endorsing RE-based power generation in Fiji	0	Dec 2012	Cabinet records (Gazette)	Relevant key stakeholders such as Prime Ministers Office, Ministry of Justice are supportive and co-operative. Decree based legislation acceptable to foreign investors Funding for the organisational reforms are approved
	A cabinet-approved comprehensive Energy Act promulgated	0	Dec 2011		
	Institutional reform of DOE to effectively administer the Fiji Energy legislation	0	Jun 2012	Organisational chart of DOE	
Output 1.2: Implementing Rules and Regulations (IRRs)	No. of specific IRRs enforced by EOP	0	Dec 2013	Government gazette, publication of regulation	Political will exists to approve and enforce IRRs. Investors and lenders interests is protected
	No. of revised IRRs proposed to enhance Energy Act implementation by EOP	0	Dec 2013		
Output 1.3: Government agencies with enhanced regulatory and institutional capacity on energy development, in general, and RE development in particular	No. of RE regulations and legal frameworks administered by DoE senior staff for IPP projects and rural electrification by EOP	0	1	Staff performance annual report, DoE files, License issued,	Retention of skilled personnel, job evaluation recommendation
	% of approved RE-based power generation projects that are fully-compliant with DOE-administered RE regulatory and legal frameworks by EOP	0	100		
OUTCOME 2 Technical feasibility of harnessing RE resources are ascertained and made widely known	No. of identified technically viable RE projects EOP	0	6	DoE files, DoE annual reports	FEA is not privatized (sold) completely and co-operates in an effort to mobilize private sector capital.
	No. of investors that made use of available technical information on feasible RE-based energy system projects by EOP	0	20		
Output 2.1: Operational Centralized Energy Database System	No. of clients that request services from the central clearinghouse for their RE-based energy systems project EOP	0	300	DoE files, DoE annual reports, information request & feedback forms	Government uses its regulatory powers to override commercial confidentiality concerns and orders data and information to be

	No. of clients that make use of the central energy database system each year	0	150		made public
	% of clearinghouse and central energy database system clients each year that are satisfied with the services received	0	80		
	No. of implemented RE-based power generation projects that were facilitated by the central clearing house system by EOP.	0	20		
Output 2.2: Completed and published RE resource assessments	No. of comprehensive RE resource assessments completed by EOP	0	12	DoE files, DoE annual reports, Resource Assessment reports, Met & PWD Annual reports, Forestry Annual Reports, FEA Annual Reports, IPP proposals	Resource data and assessments are accurate and reliable
	Average % increase in currently known RE potentials that was established after the RE resource assessments	0	Dec 2013		
	No. of investors that made use of the RE resource assessment data/information in the design of their RE-based power generation projects by EOP	0	6		
Output 2.3: Assessed feasibility of RE investments	No. of completed and published new feasibility studies of IPP investments by EOP	0	6	DOE website, IPP proposals, DOE Corporate plan, FEA Annual reports, FTIB records	Co-financing components secured
	No. of planned new feasibility analyses to be carried out (after FREPP) by EOP	0	4		
	% of interested investors in Fiji that expressed confidence in the technical and financial viabilities of RE-based power generation projects by EOP	0	30		
OUTCOME 3 Markets for specific renewable energy technologies are supported	No. of additional rural households that have access to green electricity by EOP.	0	10,000	Signed PPA, contracts, financing agreements, shareholder agreements; HIES Report, DOE Annual reports & records,	Political will exists to allow private sector investment in IPP. FEA remains a state owned utility, Private sector investors perceive Fiji as viable destination. Government ruling in other sectors does not undermine investors confidence
	No. of financial closures achieved for new RE-based power generation projects by EOP	0	20		
	No. of RET system equipment/component suppliers & distributors in Fiji by EOP	5	7		

	Overall volume of business in the RE market in Fiji by EOP, US\$ million	0	100		
Output 3.1: Designed and implemented RE-based power generation demonstration	Overall installed capacity of RE-based power generation demo projects by EOP, MW	0	4.7	DoE records, DoE Annual Report, FEA Annual Reports, FEA Corporate plan, DOE Corporate plan,	Political will including Government funding available to implement demo projects, resource ownership not an issue, demo projects are successful including no major natural disaster
	No. of demo projects that are both operationally and financially viable by EOP	0	10		
	No. of planned RE-based power generation projects that are replicating any of the demo projects by EOP	1	16		
	Total installed capacity of replication RE-based power generation projects by EOP	0	At least 3		
Output 3.2: Prepared Standard Power Purchase Agreement (PPA) for IPPs	Endorsed Standard Power Purchase Agreement (SPPA) templates that are used for IPP projects in Fiji	0	1 ¹⁶	Tender documents for competitive IPP procurement, DOE website	Interests of all parties are adequately protected.
	No. of IPP RE-based power projects that made use of any of the approved SPPA templates by EOP	0	6		
Output 3.3: Completed Investment Promotion Package	No. of prospective investors making enquiries with government agencies	0	15	DOE Annual Report, Record of Investor proposals, Investment Forum Report, List of Participants	Role of DoE as an investment facilitator accepted by Cabinet
	Cumulative number of investors that expressed and planned to invest & implement RE-based power generation projects by EOP	0	10		
Output 3.4: Completed assessment and developed RE incentives schemes	A comprehensive report on options and issues related to the establishment of a subsidy fund for private sector renewable energy investment published	0 ¹⁷	Jun 2012	Completed feasibility report	NB: Ref RE Fund Design through RESCO
OUTCOME 4 Renewable Energy	Cabinet approved-Electrification Master Plan	0	Dec 2013	Master plan document, DoE Webpage, DoE files, FEA Annual	The goal of 100% electrification is maintained; Renewable based

¹⁶ There will be only 1 standard template since there is only 1 transmission and distribution utility.

¹⁷ Prospective private RE investors do not commit funds, as investments are commercially not viable without support. Fiji's renewable energy industry remains small and weak. RE investment remains dependent on donor funding.

developments integrated into National Energy Plan towards 100% Electrification of Fiji.	Average annual budget for the Electrification Master Plan by EOP, US\$ million	0	10	Report, DOE Energy statistics Year book	power generation continue to be cost competitive; Renewable energy potential is sufficient to meet current and future demand
	% utilization of Fiji's RE resources (for power purposes) by EOP	52	90		
Output 4.1: Completed training programme on integrated energy planning (IEP) and administrative energy policy for government personnel	No. of GOF personnel trained on IEP and energy policy each year starting Year 2011	2	6	DoE records, training assessment and training plan document, records of training sessions, FNU & USP Annual Faculty Reports, Certificates	Training institutions are willing to co-operate with government, qualified staff can be retained within the Energy sector
	% trained GOF personnel that are actively engaged in RE-based power generation policy making, planning and implementation, operations and evaluation by EOP	0	50		
	No. of training institutions that are capable and qualified in IEP and energy policy training/capacity building by EOP	2	2		
Output 4.2: Completed and approved National Electrification Master Plan	Cabinet approved-Electrification Master plan	0	Dec 2013	Master plan document, DoE Webpage, DoE files, FEA Annual Report, DOE Energy statistics Year book	The goal of 100% electrification is maintained
	Average annual budget for the Electrification Master Plan by EOP, US\$ million	0	10		

TOTAL BUDGET AND WORK PLAN

Award ID:	00060769
Award Title:	Fiji Renewable Energy Power Project
Business Unit:	FJI10
Project ID:	00076656
Project Title:	Fiji Renewable Energy Power Project
Implementing Partner (Executing Agency)	Fiji Department of Energy

GEF Outcome/Atlas Activity	Responsible Party/Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Total (USD)
OUTCOME 1: Facilitation of investments on energy projects, particularly on RE and biomass based power generation	DOE	62000	GEF	71200	International Consultants	\$20,000	\$20,000	\$10,000	\$50,000
				71300	Local Consultants	\$10,000	\$10,000	\$5,000	\$25,000
				75700	Meetings & Workshops	\$5,000	\$5,000	\$5,000	\$15,000
				75700	Learning Costs	\$20,000	\$20,000	\$20,000	\$60,000
					Total Outcome 1	\$55,000	\$55,000	\$40,000	\$150,000
OUTCOME 2: Technical feasibility of harnessing RE resources are ascertained and made widely known	DOE	62000	GEF	71200	International Consultants	\$15,000	\$15,000	\$0	\$30,000
				71300	Local Consultants	\$12,000	\$12,000	\$0	\$24,000
				72500	RE Resource Assessment & Monitoring Instruments	\$15,000	\$5,000	\$5,000	\$25,000
				71600	Travel	\$5,000	\$5,000	\$5,000	\$15,000
				72200	Office equipment for CHM	\$7,000	\$7,000	\$4,500	\$18,500
				72100	Contractual Services	\$12,500	\$12,500	\$12,500	\$37,500
					Total Outcome 2	\$66,500	\$56,500	\$27,000	\$150,000
OUTCOME 3: Markets for specific renewable energy technologies are supported.	DOE	62000	GEF	71200	International Consultants	\$40,000	\$40,000	\$40,000	\$120,000
				71300	Local Consultants	\$30,000	\$30,000	\$30,000	\$90,000
				72100	Contractual Services	\$30,000	\$20,000	\$17,500	\$67,500
				75700	Learning Costs	\$30,000	\$30,000	\$30,000	\$90,000
				71600	Travel	\$15,000	\$15,000	\$15,000	\$45,000
				74200	Books & subscriptions	\$2,500	\$2,500	\$2,500	\$7,500

				74200	IEC materials	\$2,500	\$2,500	\$2,500	\$7,500		
					Total Outcome 3	\$150,000	\$140,000	\$137,500	\$427,500		
OUTCOME 4: RE developments integrated into National Energy Plan towards 100% Electrification of Fiji.	DOE	62000	GEF	71200	International Consultants	\$10,000	\$10,000	\$10,000	\$30,000		
				71300	Local Consultants	\$6,000	\$6,000	\$6,000	\$18,000		
				72100	Contractual services	\$4,000	\$4,000	\$4,000	\$12,000		
				75700	Learning Costs	\$30,000	\$30,000	\$30,000	\$90,000		
					Total Outcome 4	\$50,000	\$50,000	\$50,000	\$150,000		
PROJECT MANAGEMENT UNIT	DOE	62000	GEF	71400	Contractual Services (PM)	\$20,000	\$20,000	\$20,000	\$60,000		
				71400	Contractual Services (PA/FA)	\$8,167	\$8,167	\$8,166	\$24,500		
				71600	Travel	\$2,000	\$1,500	\$500	\$4,000		
				74100	Monitoring (Audit)	\$3,000	\$3,000	\$3,000	\$9,000		
					Total Management	\$33,167	\$32,667	\$31,666	\$97,500		
				PROJECT TOTAL				\$354,667	\$334,167	\$286,166	\$975,000

Summary of Funds: ¹⁸

	Amount Year 1	Amount Year 2	Amount Year 3	Total
GEF	\$354,667	\$334,167	\$286,166	\$975,000
Donor 2 (Government, cash and in-kind)	\$517,891	\$517,891	\$517,891	\$1,553,673
Donor 3 (Vara Renewable Energy)	\$2,500,000	\$10,000,000	\$2,500,000	\$15,000,000
TOTAL	\$3,372,558	\$10,852,058	\$3,304,057	\$17,528,673

¹⁸ Summary table should include all financing of all kinds: GEF financing, co-financing, cash, in-kind, etc...

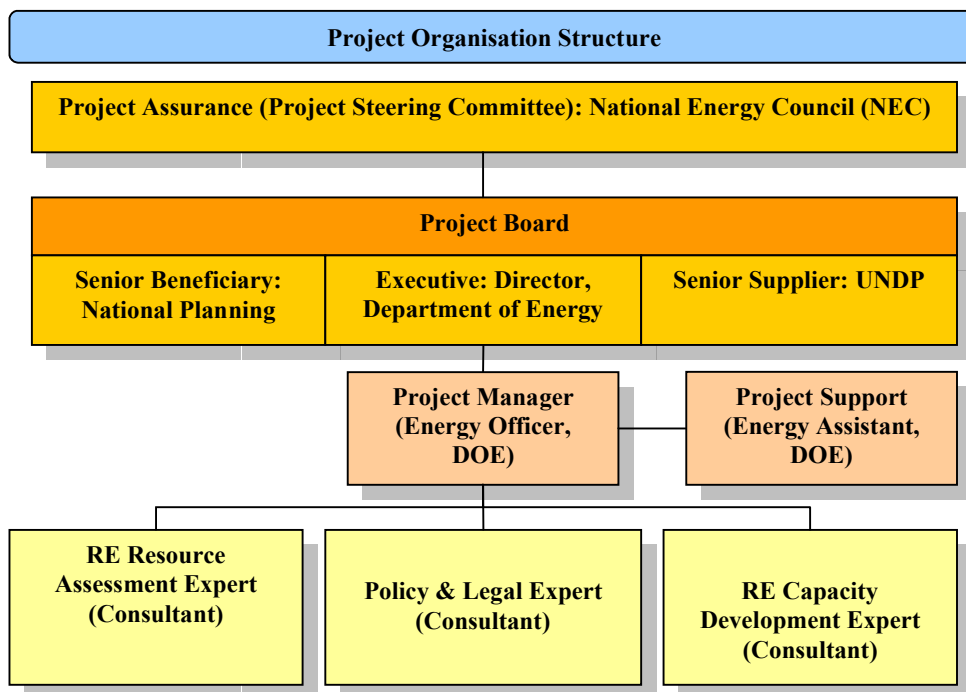
4. MANAGEMENT ARRANGEMENTS

Implementation Arrangement

120. The FDOE is the designated Implementing Partner for the project. It will execute the project on behalf of the Government of Fiji (GOF) under the National Implementation Modality (NIM) of the UNDP. UNDP-Fiji, which provides support to the project on behalf of the GEF takes the role of the Senior Supplier, while National Planning Ministry represents the GOF and act as the Senior Beneficiary of the Project. The three parties make up the core members of the Project Board which main function is to strategically guide the course of the project towards achieving its objective.

Roles and Responsibilities

121. Establishing an effective project management structure is crucial for the project's success. The FREPP has need for direction, management, control and communication and has been designed according to the following project organisation structure.



122. **Project Board** is responsible for making management decisions in particular when guidance is required by the Project Manager. The Project Board plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the Project Board can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

123. In order to ensure UNDP's ultimate accountability for the project results, Project Board decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case consensus cannot be reached within the Board, the final decision shall rest with the UNDP Project Manager.
124. Potential members of the Project Board are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Board as appropriate. The Board contains three distinct roles, including:
- a) **An Executive:** individual representing the project ownership to chair the group.
 - a. *Director of Department of Energy.*
 - b) **Senior Supplier:** individual or group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project.
 - a. *Representative of UNDP.*
 - c) **Senior Beneficiary:** individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries.
 - a. *Representative of the Ministry of National Planning.*
 - d) The **Project Assurance** role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The Project Manager and Project Assurance roles should never be held by the same individual for the same project.
125. **Project Manager:** The Project Manager has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost.
126. The implementing partner appoints the Project Manager, who should be different from the Implementing Partner's representative in the Project Board. The implementing partner is the entity responsible and accountable for managing the project, including the monitoring and evaluation of project interventions, achieving project outputs, and for the effective use of UNDP resources. The implementing partner may enter into agreements with other organisations or entities to assist in successfully delivering project outputs. Possible implementing partners include government institutions, other eligible UN agencies and Inter-governmental organisations (IGOs), UNDP, and eligible NGOs. Eligible NGOs are those that are legally registered in the country where they will be operating. Proposed implementing partners must be identified based on an assessment of their legal, technical, financial, managerial and administrative capacities that will be needed for the project. In addition, their ability to manage cash must be assessed in accordance with the Harmonised Approach for Cash Transfers (HACT). The most recent capacity assessment (13th July 2010) had a total rating of 93% indicating very high capacity of Fiji's Department of Energy to successfully implement the project.
127. **Project Support:** The Project Support role provides project administration, management and technical support to the Project Manager as required by the needs of the individual project or Project Manager.

128. Financial Arrangements: FREPP will be nationally implemented (NIM) by the Government of Fiji through the Department of Energy, where the focal point of contact will be the Director, Department of Energy. The Department of Energy will:
- Be responsible for the financial control of the project through the NIM of UNDP. UNDP will administer the Budgetary requirements for the Government of Fiji;
 - Sign-off on all budget and work-plan revisions and maintain project accounts and financial responsibility;
 - Work with the project and assume responsibility for entering into necessary work arrangements with other national, state and regional organizations for efficient and effective project implementation;
 - Support the project by providing guidance and authority to engage services consistent with the objectives of the project; and
 - Receive advances equivalent to the financial needs of the project as indicated in the quarterly work plans provided.
129. Funds will be released to the Development Account of the Ministry of Finance. The Ministry of Finance will be responsible for the initial warrant and disbursement of funds in accordance with the work plan and the project document. Further cash advances will be contingent upon timely reporting of expenditure by the Department of Energy to the UNDP MCO, Fiji.

5. MONITORING FRAMEWORK AND EVALUATION

130. The project will be monitored through the following M& E activities. The M& E budget is provided in the table below.

Project Start:

131. A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.
132. The Inception Workshop should address a number of key issues including:
- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
 - Based on the project results framework and the relevant GEF Tracking Tool if appropriate, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
 - Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
 - Discuss financial reporting procedures and obligations, and arrangements for annual audit.

- Plan and schedule Project Board meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.
133. An Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly:

134. The following tasks shall be done:
- Monitoring of the progress made in the UNDP Enhanced Results Based Management Platform.
 - Regular updating of the risk log (Annex 1) based on the initial risk analysis submitted, in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).
 - Project Progress Reports (PPR) based on the information in Atlas, and generated in the Executive Snapshot.
 - Monitoring issues, lessons learnt, etc. through the use of other ATLAS logs. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annually:

135. Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and GEF reporting requirements.
136. The APR/PIR includes, but is not limited to, reporting on the following:
- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative).
 - Project outputs delivered per project outcome (annual).
 - Lesson learned/good practice.
 - AWP and other expenditure reports
 - Risk and adaptive management
 - ATLAS QPR.
 - Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

Periodic Monitoring Through Site Visits:

137. UNDP CO and the UNDP RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

Mid-term of Project Cycle:

138. The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (i.e. around April 2012). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the UNDP Evaluation Office Evaluation Resource Center (ERC). The relevant GEF Focal Area Tracking Tools will also be completed during the mid-term evaluation cycle.

End of Project:

139. An independent Final Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the UNDP-GEF Asia-Pacific Regional Coordinating Unit.
140. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC).
141. The relevant GEF Focal Area Tracking Tools will also be completed during the final evaluation. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

Learning and Knowledge Sharing:

142. Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The activities in the project are also designed in such a way that whenever knowledge products are produced, these are reviewed through a participatory process before these are finalized, officially documented and disseminated as project deliverables.
143. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation through lessons learned. The project will identify, analyze, and share lessons learned that might be

beneficial in the design and implementation of similar future projects. Finally, there will be a two-way flow of information between this project and other projects of a similar focus.

Table 9: Monitoring & Evaluation Work Plan and Budget

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team staff time</i>	Time frame
Inception Workshop and Report	<ul style="list-style-type: none"> ▪ Project Manager ▪ UNDP CO, UNDP GEF 	10,000	Within first two months of project start up
Measurement of Means of Verification of project results.	<ul style="list-style-type: none"> ▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members. 	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress	<ul style="list-style-type: none"> ▪ Oversight by Project Manager ▪ Project team 	To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ UNDP GEF RTA ▪ UNDP EEG 	None	Annually
Periodic status/ progress reports	<ul style="list-style-type: none"> ▪ Project manager and team 	None	Quarterly
Mid-term Evaluation	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ UNDP GEF RCU ▪ External Consultants (i.e. evaluation team) 	25,000	At the mid-point of project implementation.
Final Evaluation	<ul style="list-style-type: none"> ▪ Project manager and team, ▪ UNDP CO ▪ UNDP GEF RCU ▪ External Consultants (i.e. evaluation team) 	25,000	At least three months before the end of project implementation
Project Terminal Report	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ local consultant 	0	At least three months before the end of the project
Audit	<ul style="list-style-type: none"> ▪ UNDP CO ▪ Project manager and team 	9,000	Yearly
Visits to field sites	<ul style="list-style-type: none"> ▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives 	Paid from IA fees and operational budget	Yearly
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		US\$ 69,000 (+/- 5% of total budget)	

Audit Arrangement:

The Government will provide UNDP Resident Representative with certified periodic financial statements, and with an annual audit of the financial statements relating to the status of UNDP (including GEF) funds in accordance with UNDP Financial Regulations and Rules and Audit policies. The Audit will be conducted by a certified audit firm. UNDP will be responsible for making audit arrangements for the project in communication with the Project Implementing Partner. UNDP and the project Implementing Partner will provide audit management responses and the Project Manager and project support team will address audit recommendations.

6. LEGAL CONTEXT

144. This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the SBAA [or other appropriate governing agreement] and all CPAP provisions apply to this document.
145. Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.
146. The implementing partner shall:
- Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried; and
 - Assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.
 - UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.
147. The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.
148. The responsibility for the safety and security of the Implementing Partner and its personnel and property, and of UNDP's property in the Implementing Partner's custody, rests with the Implementing Partner. The Implementing Partner shall: (a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried; (b) assume all risks and liabilities related to the Implementing Partner's security, and the full implementation of the security plan. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

ANNEXES

A. Risk Log

B. **Agreements:** *GEF OFP letter, GEF PIF, Co-financing Letters from GOF and **Vara Renewable Energy**.*

C. **Estimated CO₂ Emission Reductions.**

D. **Profiles of Demonstration Projects**

E. **Annual Targets**

Annex A: Risk Log

Project Title: Fiji Renewable Energy Project (FREPP)					Award ID:		Date: 31 st July 2010		
#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Management Response	Owner	Submitted, updated by	Last Update	Status
1	Ineffective project management - The capacity in the Government of Fiji to effectively manage and implement major national projects is limited. At times, the limited available local capacity is utilized in many externally funded projects thereby diverting attention from higher priority national activities.	31 st July 2010	ORG	P = 3 (medium) I = 5 (high)	Dedicated project personnel will facilitate effective and efficient implementing of project activities. As such it is the plan that the proposed project will fund full time staff, which depending on the need the Government of Fiji will consider absorbing into its service at the end of the project	Project Manager	Project Developer	n/a	As of date, budgetary allocations for Project Management Office staff comprising Manager and Assistant are made for entire FREPP lifetime.
2	Limited recognition and commitment of the Government of Fiji including its relevant branches and agencies of the importance of comprehensive energy legislation – This also include the lack of appropriate allocation of government resources and enforcement on energy development initiatives.	31 st July 2010	POL; OPR	P = 3 (medium) I = 5 (high)	Raise project profile and advocate for project benefits right from the outset including during Consultation and Design Workshop & Inception Workshop, ensure that all key stakeholders are involved and updated on progress regularly, and engage key policy stakeholders in activities.	Project Manager	Project Developer	n/a	Outcome 1 activities are appropriately designed to secure political will for passage and enforcement of energy legislation.
3	Political change – Changes in the government can result in the new administration not supporting the energy policies, and possibly repeal of the Energy Act	31 st July 2010	POL	P = 3 (medium) I = 5 (high)	The Preparation and endorsement of a comprehensive legislative framework (i.e., Energy Act and associated IRRs) will help ensure that the overall directions in the energy sector will survive changes in government	Project Manager	Project Developer	n/a	As per above, Outcome 1 activities are appropriately designed to survive changes in government.

4	Failure of some of the demonstration projects - Failures of the demo projects will reduce stakeholder (including public and private investors and donors) confidence to invest including finance required hardware installations.	31 st July 2010	OPR ENV	P = 1 (low) I = 5 (high)	The proposed package of capacity building and enabling environment activities, centered on each demonstration project, will facilitate sustainability of these projects.	Project Manager	Project Developer	n/a	Outcome 3 activities appropriately designed with sustainability dimensions considered.
5	Lower oil prices - A significant reduction in fossil fuel prices makes renewable energy a less attractive option to local, national and international investors.	31 st July 2010	POL	P = 1 (low) I = 5 (high)	While the project has no control on oil prices, the project will take this into consideration in the formulation of the energy policy and in the integrated energy planning.	Project Manager	Project Developer	n/a	Outcome 4 activities appropriately designed to take on-board such considerations.

ENV = Environmental; OPR = Operational; ORG = Organizational; POL = Political



Annex B – Agreements

GEF Operational Focal Point (Letter of Endorsement)

**MINISTRY OF LOCAL GOVERNMENT, URBAN DEVELOPMENT,
HOUSING AND ENVIRONMENT**

DEPARTMENT OF ENVIRONMENT
Level 1 P D Patel Building
90 Raajibhai Patel Street, Suva, Fiji

All correspondence to be addressed to:
Director of Environment
P. O. Box 2109
Government Buildings, Suva, Fiji
Website: www.environment.gov.fj

TELEPHONE NO: (679) 3311-699; 3311069 (ODS) **FAX NO: (679) 3312-879/3318-098(ODS)**

Our File Ref: EP.8/13 Your Ref:

29th July 2010

Mr. Yannick Glemarec
UNDP/GEF Executive Coordinator
304 East 45th Street
9th Floor
New York, NY10017
U. S. A

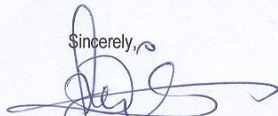
Dear Sir,

Subject: Endorsement Letter for the Fiji Renewable Energy Power Project (FREPP) Medium-Sized Project

In my capacity as GEF Operational Focal Point for Fiji, I confirm that the above project document (a) is in accordance with the government's national priorities, including, Fiji's National Energy Policy, and the commitments made by Fiji under the relevant global environmental conventions and (b) has been discussed with relevant stakeholders, including the UNFCCC focal point, in accordance with GEF's policy on public involvement.

Accordingly, I am pleased to endorse the preparation of the above project proposal with the support of UNDP. If approved, the proposal will be prepared and implemented by Department of Energy under the Ministry of Works, Transport & Public Utilities. Further, I request UNDP to provide a copy of the Project Document and CEO Endorsement Request for information of this office before it is submitted to the GEF Secretariat for CEO endorsement.

I understand that the total GEF financing being requested for this project is US\$1,100,000 inclusive of project preparation grant (PPG) and Implementing Agency fee (10%) to UNDP for project cycle management services associated with this project.

Sincerely,

Mr. Jope Davetanivalu
Director, Department of Environment and UNFCCC Focal Point

"Our Environment, Our Investment, Our Responsibility"

Vara Renewable Energy (Letter of Commitment for Co-Financing)

Vara Renewable Energy

All correspondence to be addressed to:
P. O. Box S.55, MH Superfresh, Tamavua, Suva
Telephone: (875) 9755 093
Email: steve@deltarenewablefiji.com

30th August 2011

Mr Knut Ostby
Resident Representative
UNDP Fiji Multi-Country Office
Level 8, Kadavu House
Suva.

Dear Mr Ostby,

RE: BIOMASS 3MW VARA RENEWABLE ENERGY POWER DEVELOPMENT

Further to various discussions, Vara Renewable Energy (VRE) is willing to accept up to US\$115,000 as incremental cost from GEF towards implementation of research activities on RE-based power generation that will be carried out in Fiji under the UNDP-GEF project Fiji Renewable Energy Power Project (FREPP). The project being put forward is the Vara Renewable Energy Development for Nadi South, which will use biomass and will generate 3MWe to be injected into the national electrical grid. Annex 1 contains details of budget items that will be financed by FREPP.

The project budgeted capital cost is US\$15 million.

We are willing to co-operate with UNDP-GEF and other donors for our renewable project over a period of 3 years and to utilise this project for demonstration purposes.

We assume that all the direct costs associated with producing the outputs described in the project brief will qualify as co-financing.

Yours Sincerely,



Steve Foley
Chief Executive Officer
Vara Renewable Energy

Annex 1: Budget items sought from UNDP-GEF FREPP

OUTCOME 3: Markets for specific renewable energy technologies are supported		VRE	UNDP-GEF	Total
Activity	Details			
3.1.1: Promotion of the Demonstration Schemes	Consultation (travel)	15,000	15,000	30,000
3.1.2: Evaluation and Confirmation of the Demonstrations	Comprehensive techno-economic feasibility & analysis (travel)	15,000	5,000	20,000
3.1.3: Baseline Data Establishment for the Demonstrations	Conduct surveys and research on: power gen performance parameters, supply of RE resources, Annual Generation statement, Negative cost impact, snapshot current socio-eco conditions.	0	49,500	49,500
	Summation into cornerstone (baseline activity)	0	16,000	16,000
3.1.5: Facilitation of the Requirements for the Installation of the Demonstrations	Land acquisition (travel)	0	5,000	5,000
3.1.6: Installation and Operation of each Demonstration Project	Capacity building for ongoing monitoring and evaluation (system implementation and training of third party)	0	25,000	25,000
Total		30,000	115,000	145,500

Ministry of Public Utilities – Dept. of Energy (Letter of Commitment for Co-Financing)



MINISTRY OF PUBLIC UTILITIES [Water & Energy]
DEPARTMENT OF ENERGY

Website : www.fdoe.gov.fj
E-mail : energy@govnet.gov.fj

P O Box 2493
Government Buildings
Suva, Fiji Islands

Tel : (679) 338 6677, 338 6006
Fax : (679) 338 6301

Our Ref: E 6/7/1

4 November, 2010

Mr. Knut Ostby
Resident Representative
United Nations Development Programme
Suva, Fiji

Dear Mr. Ostby

This is to confirm that the Ministry of Public Utilities (Department of Energy) is committing funds in cash amounting to USD 1,553,673 (FJD 3,000,000) for the implementation of research activities on renewable energy resources and renewable energy-based power generation activities (biofuel-fired power generation) that are part of the baseline activities that will be carried out in Fiji under the UNDP-GEF project *Fiji Renewable Energy Power Project (FREPP)*. These funded activities are part of the Department of Energy's planned 20 biofuel mill projects (including biofuel-based power generation) in Fiji's outer islands. The Department of Energy is willing to cooperate with the UNDP and other partners of the FREPP over a period of 3 years and to subsume these budgeted activities as baseline to said project; and in that regard consider the budget for these activities as co-financing.

The Department of Energy's support to the FREPP is described in detail in the FREPP Project Document and associated budget. We assume that all of its direct costs associated with producing outputs described in the Project Document qualify as co-financing for the FREPP.

Sincerely Yours,

A handwritten signature in black ink, appearing to read 'P. Nakavulevu'.

Mr. P. Nakavulevu
Acting Director of Energy

Annex C – CO2 Emission Reduction Estimates

Summary

The goal of the Fiji Renewable Energy Power Project (FREPP) is the reduction of GHG emissions from Fiji's power sector. This proposed project will contribute to the realization of that goal by removing barriers preventing the commercial applications of renewable energy (RE)-based power generation in Fiji. The removal of barriers is expected to result in actions that would influence increased investments by the government and the private sector in power generation using Fiji's RE resources.

Data & Assumptions

The following are the data and assumptions used in estimating the CO2 emission reductions from specific GHG reduction interventions that will be carried out under this project (i.e., RE-based power generation demonstrations).

- Biomass-based Power Generation Plant – 3.2 MW design capacity; 3.0 MW operational capacity; 81.0% average capacity factor; Grid Connected (grid emission factor = 0.568 ton CO2/MWh); Plant Life = 20 years
- Biodiesel Mill - 20 units x 192 klits/year; At least 60% biofuel net production for power generation – 40% for transport fuel. Diesel CO2 emission factor = 2.649 kg/lit; Specific Fuel Consumption (Diesel gensets) = 0.327 lit/kWh; Lifetime of diesel gensets = 10 years.
- 1 GWh electricity = 0.344 ktoe.

Direct CO2 Emission Reductions

The direct CO2 emission reductions that can be directly attributable to FREPP are from the 2 demonstration projects that will be carried out under Component 3 of the project. These are the: (1) Biomass-based Power Generation Project; and, (2) Biofuel Power Generation Project.

The biomass-based power generation facility that will be implemented as a demonstration of the design, engineering, planning, financing, installation, operation and maintenance of a commercial RE-based power generation project is expected to generate $3.0 \times 0.81 \times 8760 = 21,287$ MWh of electricity each year. This grid connected power generation facility will displace part of the diesel fuel-fired dominated electricity grid. With an average grid CO2 emission factor of 0.568 ton CO2/MWh, the annual CO2 emission reduction $21,287 \times 0.568 = 12,091$ tons. Considering a 20 year plant life, this translates to a 241,820 tons CO2. To be conservative, a 10 year period is considered and this results in 120,910 tons.

The biofuel mills (20 units) demonstration projects involve the production of biofuel (i.e., 80/20 coco/diesel mixture) in each mill at a rate of 240,000 lits/year. The net production is 192,000 lits/year. About 40% of the net biofuel production will be sold as transport fuel (replacing automotive diesel). The 60% of the net production (115,200 lits/year) is for power generation, the electricity produced will be sold to households and establishments in the communities/villages around the mill site. The annual electricity production using the biofuel from each mill is about 352.3 MWh @ 0.327 lits/kWh specific fuel consumption. The use of the biofuel translates to a $115,200 \times 0.8 \times 2.649/1000 = 244.1$ tons CO2 emission reduction. For 20 mills, this amounts to 4,882.6 tons CO2/year. Throughout an estimated plant life of the biofuel mill of 10 years, this comes up to 48,826 tons.

Hence, the combined total CO2 emissions from the 2 demonstrations is 120,910 + 48,826 = 169,736 tons. Considering the US\$ 975,000 GEF contribution to the FREPP, the unit abatement cost for this project is US\$ 5.74/ton CO2¹⁹

Direct Post-Project CO2 Emission Reductions

Apart from the 2 demonstrations, FREPP will focus on the creation of the enabling environment that will influence the government and private sector to venture to RE-based power generation. Hence, while there are expected replications of the demonstrations, FREPP won't be able to work directly on the development of new RE-based power generation projects. Hence, for the succeeding RE-based power generation projects (after FREPP), the resulting CO2 emission reductions can potentially be only be attributed indirectly to FREPP. Hence, no direct post project CO2 emissions can be claimed.

Indirect CO2 Reductions and Energy Savings

Following the expected success of the 3.2 MW biomass-based power plant demo and small-scale power generation demo using biofuels, it is expected that even without government intervention, the private sector will be ready to invest in RE-based power generation in the next 10 years (at least up to 2025). Considering a top-down approach, the alternative scenario in shows potential RE-based power projects are planned to be implemented between 2015 and 2025.

Potential Future Projects/Year	2015	2020	2025
Others (Biomass - wood 86.6MW ~ 355GWh)	89	107	178

The estimated cumulative CO2 emission reduction from these potential grid connected biomass-based power generation projects is 657,744 tons (assuming a grid emission factor of 0.568 ton CO2/MWh in Viti Levu, where these power plant are most likely to be constructed).

Considering the significant barrier removal work that will be done under the project, it is deemed that the GEF influence in achieving the above mentioned CO2 emission reductions during the influence period, may be considered quite high. In this regard, most of the indirect CO2 reduction may be attributed in a way to interventions that will be carried out under the FREPP such as establishment and enforcement of the Energy Act and financing mechanisms, market enhancements and the successful demonstration projects. In this case, the GEF Causality Factor (CF) can be taken as Level 3 ("substantial but modest"), i.e. 60%. The indirect CO2 emission in this case is: 657,744 x 0.6 = 394,646 tons CO2.

Considering a bottom up approach – if a replication factor of 3 will be used, the indirect CO2 emission reduction would be 3 x 169,736 = 509,206 tons CO2.

Hence the range of indirect CO2 emission reductions is 395 – 509 ktons CO2.

Estimated CO2 Emission Reductions Attributable to FREPP (ktons CO2)

Category	Quantity	Remarks
Direct	169.7	From the demonstrations (biomass-based energy; biofuel)
Indirect (Top Down)	394.6	GEF Causality Factor = 0.6
Indirect (Botton-Up)	509.2	Replication Factor = 3

¹⁹ If automotive diesel fuel displacement due to biodiesel (i.e., 40% of production of biofuel mill) used in transport is considered, UAC = US\$ 4.82/ton CO2

Annex D - Profiles of Demonstration Projects

A. Biomass-based Power Generation

This is a 3.2 MW power generation project that will make use of sustainable straw (sweet sorghum or similar) as a fuel (sourced locally). The expected annual power generation is about 21.3 GWh at an average capacity factor of 81.0%. The power plant project, which will be located in South Nadi in the island of Viti Levu in Fiji, is owned by Delta Renewable Energy Limited, which has incorporated a company (Vara Renewable Energy) to facilitate and ensure the long term management, operation, and success of its project, *Vara Renewable Energy Facility*, that will involve the construction, operation, and selling of electricity from the power plant to the Fiji Electricity Authority (FEA).

As a demonstration under the FREPP, this will showcase the commercial aspects of RE-based power generation projects from the design, acquisition of land titles, easements and permits, engineering, planning, financing, installation, to operation and maintenance.

The annual 21,286 MWh of electricity production will displace part of the diesel fuel-fired dominated electricity grid. With an average grid CO₂ emission factor of 0.568 ton CO₂/MWh, the annual CO₂ emission reduction is $21,287 \times 0.568 = 12,091$ tons.

Among others, FREPP will provide technical assistance for: community consultations including such needed for land acquisitions; required surveys and research including assessment of power generation performance parameters, estimation of supply of renewable energy resources, and determination of baseline socio-economic conditions in targeted communities; and capacity building for on-going monitoring.

B. Biofuel Power Generation

The biofuel mills demonstration project is funded by the FDOE. It involves the setting up of 20 biofuel mills in various outer islands where there is significant copra making activities. Each biofuel mill project will basically involve the extraction of coconut oil from copra and mixing it with diesel oil at 80% vol coconut oil and 20% vol diesel oil. The biofuel product is a 80/20 coco/diesel mixture. It will be used for power generation to supply communities/villages in the island where the biofuel mill is located, replacing part of the diesel fuel that is typically used in power generation in these localities. About 60% of the net production of 192,000 lits/year will be sold for power generation, The rest will be sold as transport fuel (substitute for automotive diesel oil) in areas where the demand for this diesel fuel substitute is high.

The power generation will be carried out in existing diesel power generation facilities in the outer islands. Part of the diesel fuel consumption in these facilities will be replaced by biofuel produced from the mills. enset) will be instaled in the biofuel mill area. The annual electricity production using the biofuel from each mill is estimated at about 352.3 MWh @ 0.327 lits/kWh specific fuel consumption. The use of the biofuel translates to a 244.1 tons CO₂ emission reduction per mill. For 20 mills, this amounts to 4,882.6 tons CO₂/year. Throughout an estimated plant life of the biofuel mill of 10 years, this comes up to 48,826 tons CO₂ emission reduction.

For this biofuel-based power generation demonstration project, FREPP will provide technical assistance in the establishing a rational tariff for the RE electricity generated. In case the mill is located in a FEA franchise area, the demonstration host will be assisted in securing of the PPA for this project, as well as in facilitating the securing of the required permits and EIAs. FREPP will design and develop the M&E system for tracking and evaluating the performance of the

power generation facilities. It will also provide technical assistance, where requested/necessary, in the design and engineering of the necessary retrofits in the existing diesel power plant in order to accommodate the biofuel firing. FREPP will provide the necessary capacity building for the power plant operating personnel in the proper and safe operation of the biofuel fired diesel engine sets, including the proper handling and storage of biofuel.

The following are the cost data (Fiji dollars) used in the estimation of cost savings from the utilization of biodiesel (as a replacement for diesel fuel oil) in power generation using diesel power generator sets in the outer islands of Fiji where most of the biodiesel production can be found.

Parameters	Estimates
Biodiesel Cost (FJS)	2.26 (Retail price), 2.80 (outer Island)
Diesel Fuel Oil (DFO) Cost (FJS)	2.31 (Retail price), 3.00 (outer Island)
Generation cost of diesel power generation in outer islands (FJS/kWh) Assume PF = 1; 20 kVA = 20 kW	Average Consumption for a 20kVA Gen-Set = 6.54 L/h @ 0.327 lit/kWh. On an hourly basis: At DFO cost = \$3.00/lit, O&M cost = \$0.22/kWh, Electricity generation = 20 kWh; Total Cost = \$20.06/h or \$1.003/kWh
Generation cost of biodiesel power generation in outer islands (FJS/kWh) Assume PF = 1; 20 kVA = 20 kW	Average Consumption for a 20kVA Gen-Set = 6.54 L/h @ 0.327 lit/kWh. On an hourly basis: At biodiesel cost = \$2.80/lit, O&M Cost = \$0.22/kWh, Electricity generation = 20 kWh; Total Cost = \$18.75/h or \$0.938/kWh

Annex E - Annual Targets

Strategy	Indicator	Targets	Year 1	Year 2	Year 3
Goal Reduction of greenhouse gas emissions from Fiji's power sector	• Cumulative gas emission from power generation in Fiji by the end of project (EOP), ktons CO ₂	• 935.8	• 316.4	• 632.8	• 935.8
Project Objective Removal of major barriers to the widespread and cost-effective use of grid-based renewable energy supply via commercially viable renewable energy technologies	<ul style="list-style-type: none"> • Cumulative installed private sector-owned RE-based power generation capacity by EOP, MW • Share of RE in Fiji's power generation mix by EOP, % • Cumulative electricity production from RE-based power generation facilities by EOP, GWh 	<ul style="list-style-type: none"> • 4.7 • 89 • 1505.1 	<ul style="list-style-type: none"> • 0 • 60 • 494.0 	<ul style="list-style-type: none"> • 1.5 • 75 • 988.0 	<ul style="list-style-type: none"> • 4.7 • 89 • 1505.1
OUTCOME 1 Facilitation of investments on energy projects, particularly on RE and biomass based power generation	• Cumulative investment on RE-based power generation by EOP, US\$ million	• 100	• 30	• 65	• 100
OUTCOME 2 Technical feasibility of harnessing RE resources are ascertained and made widely known	<ul style="list-style-type: none"> • No. of identified technically viable RE projects EOP • No. of investors that made use of available technical information on feasible RE-based energy system projects by EOP 	<ul style="list-style-type: none"> • 6 • 20 	<ul style="list-style-type: none"> • 2 • 10 	<ul style="list-style-type: none"> • 4 • 15 	<ul style="list-style-type: none"> • 6 • 20
OUTCOME 3 Markets for specific renewable energy technologies are supported	<ul style="list-style-type: none"> • No. of additional rural households that have access to green electricity by EOP. • No. of financial closures achieved for new RE-based power generation projects by EOP • No. of RET system equipment/component suppliers & distributors in Fiji by EOP • Volume of business in the RE market in Fiji by EOP, US\$ million 	<ul style="list-style-type: none"> • 10,000 • 20 • 7 • 100 	<ul style="list-style-type: none"> • 3,000 • 10 • 2 • 25 	<ul style="list-style-type: none"> • 7,500 • 15 • 5 • 75 	<ul style="list-style-type: none"> • 10,000 • 20 • 7 • 100
OUTCOME 4 Renewable Energy developments integrated into National Energy Plan towards 100% Electrification of Fiji.	<ul style="list-style-type: none"> • Cabinet approved-Electrification Master Plan • Average annual budget for the Electrification Master Plan by EOP, US\$ million • % utilization of Fiji's RE resources (for power purposes) by EOP 	<ul style="list-style-type: none"> • Dec 2013 • 10 • 90 	<ul style="list-style-type: none"> • Draft • 10 • 80 	<ul style="list-style-type: none"> • Submitted • 10 • 85 	<ul style="list-style-type: none"> • Enforced • 10 • 90