

## PROJECT IDEA NOTE (PIN)

**Name of Project: National Grid-connected Hydropower PoA in Fiji**

**Date submitted: 10 May, 2012**

### **Description of size and quality expected of a PIN**

Basically a PIN will consist of approximately 5-10 pages providing indicative information on:

- the type and size of the program
- its location
- the anticipated total amount of GHG reduction compared to the “business-as-usual” scenario (which will be elaborated in the baseline later on at PoA DD and CPA DD level)
- Duration of the program and crediting period of the CPAs under the Program
- the estimated CER price in US\$/ton CO<sub>2</sub>e reduced
- the financial structuring (indicating which parties are expected to provide the project's financing)
- the project's other socio-economic and environmental effects/benefits

**While every effort should be made to provide as complete and extensive information as possible, it is recognised that full information on every item listed in the template will not be available at all times for every project.**

## A. Program Description, Type, Boundary and Schedule

<p><b>Objective of the Program</b> <i>(Describe the policy/measure or stated goal that the PoA seeks to promote)</i></p>	<p>The objective of the proposed Programme of Activities (PoA) is to utilize the water resources for electricity generation and deliver it to the grid, which is managed by the Fiji Electricity Authority (FEA). The proposed PoA will accomplish greenhouse gas (GHG) mitigation by avoiding usage of diesel for electricity generation. The proposed PoA will also meets the increasing demand for electricity and needs for electricity grid expansion in Fiji.</p>																		
<p><b>Program Description and Proposed Activities</b> <i>(About ½ page)</i></p>	<p>In Fiji, the number of sites already identified by the Fiji Electricity Authority (FEA) would be enough for the development of a small scale hydro PoA. The FEA has identified several sites that have high hydropower project development potentials. FEA would like to develop one CDM PoA for all the grid-connected hydropower project activities to be developed in the coming years in Fiji. As a significant share of electricity generation is based on diesel in Fiji, GHG emission reductions could be achieved by the proposed project.</p> <p>Fiji Electricity Authority (FEA) plans to construct and operate several hydropower projects activities in Viti-Levu Island in Fiji in the near future. Among them, Wailoa Downstream Hydropower Project is a small-scale hydropower Component Project Activity (CPA), which could be the first real case CPA under the proposed PoA. The installed capacity of the CPA is 15MW. The proposed CPA is still under feasibility study stage.</p>																		
<p><b>Technology to be Employed</b> <i>(Describe in not more than 5 lines)</i></p>	<p>In a hydropower plant, the main components are dam, pentock, turbine, generator, transformer and tailraces. Dam is used to hold back water, creating a large reservoir. Gates on the dam open and gravity pulls the water through the penstock, a pipeline that leads to the turbine. Water builds up pressure as it flows through this pipe. The water strikes and turns the large blades of a turbine, which is attached to a generator above it by way of a shaft. As the turbine blades turn, so do a series of magnets inside the generator. Giant magnets rotate past copper coils, producing alternating current (AC) by moving electrons. The transformer inside the powerhouse takes the AC and converts it to higher-voltage current. By the end, used water is carried through tailraces, and re-enters the river downstream. The technology details of the proposed CPA are listed as follows:</p> <p>Wailoa Downstream Hydropower Project (15MW)</p> <table border="1" data-bbox="660 1648 1390 1935"> <tr> <td colspan="2"><b>Turbine</b></td> </tr> <tr> <td>Output (MW):</td> <td>5</td> </tr> <tr> <td>Unit</td> <td>3</td> </tr> <tr> <td>Rated revolution (r/min)</td> <td>300</td> </tr> <tr> <td>Rated head (m)</td> <td>23.5</td> </tr> <tr> <td colspan="2"><b>Generator</b></td> </tr> <tr> <td>Rated power (MW)</td> <td>5</td> </tr> <tr> <td>Unit</td> <td>3</td> </tr> <tr> <td>Rated voltage (kV)</td> <td>6.3</td> </tr> </table>	<b>Turbine</b>		Output (MW):	5	Unit	3	Rated revolution (r/min)	300	Rated head (m)	23.5	<b>Generator</b>		Rated power (MW)	5	Unit	3	Rated voltage (kV)	6.3
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<p><b>Type of Program</b></p>																			

Greenhouse gases targeted CO <sub>2</sub> /CH <sub>4</sub> /N <sub>2</sub> O/HFCs/PFCs/SF <sub>6</sub> (mention what is applicable)	CO <sub>2</sub>
<b>Boundary of the Program</b>	
The boundary for the PoA in terms of a geographical area	Fiji's main island (Viti-Levu)
<b>Duration of the Program</b>	
Starting Date	2013
Duration/Length	28 years
<b>Program Coordinating/managing Entity</b>	
Name of the Coordinating Entity	Fiji Electricity Authority (FEA)
Confirm that the program is a voluntary action by the coordinating/managing entity	The program is a voluntary action by the FEA.
Organizational category (private entity or public entity)	Public entity
Summary of the relevant experience and capability of the Coordinating Entity ( <i>Describe in not more than 5 lines</i> )	A Rural Electrification Policy (REP) had been in place since 1994 and it provided a framework in which Government facilitates access to electricity for the rural population. In addition Government in 2003 approved a Charter for Renewable Energy-based rural electrification schemes. The Charter provides a mechanism for renewable energy service companies (RESCO) to install and maintain renewable energy-based projects.
<b>Host Parities</b>	Republic of Fiji
<b>Program Participants</b>	
Name of the Project Participant	Fiji Electricity Authority (FEA)
Role of the Project Participant	<b>a. Project Operator</b> b. Owner of the site or project c. Owner of the emission reductions d. Seller of the emission reductions e. Project advisor/consultant f. Project investor g. Other, please specify: _____
Organizational category	a. Government <b>b. Government agency</b> c. Municipality d. Private company e. Non Governmental Organization f. Other, please specify: _____
Summary of the relevant experience of the Project Participant <i>Describe in not more than 5 lines</i>	FEA has adopted a renewable energy development strategy since 2001. Through a joint venture initiative, FEA has completed two mini hydro projects (Wainikasou 6MW and Nagado 2.8MW) and in August 2007.
Name of the Project Participant	N/A
Role of the Project Participant	a. Project Operator b. Owner of the site or project c. Owner of the emission reductions d. Seller of the emission reductions e. Project advisor/consultant f. Project investor g. Other, please specify: _____
Organizational category	a) Government b) Government agency c) Municipality d) Private company e) Non Governmental Organization

	f) Other, please specify: _____
Summary of the relevant experience of the Project Participant <i>Describe in not more than 5 lines</i>	
<i>Please insert information for additional Project Participants as necessary.</i>	
<b>Operational /management arrangements</b>	
Operational and management arrangements between the coordinating entity and the participating organisations	N/A
<b>Expected Schedule</b>	
Earliest Program starting date <i>Month/Year in which PoA will be operational</i>	2013
Expected first year of CER delivery	2015
Lifetime of the CPAs <i>Number of years</i>	28 years
For CPAs: Expected Crediting Period <i>7 years twice renewable or 10 years fixed</i>	7 years twice renewable

## B. Methodology and Additionality of the Programme of Activities

<b>Sector Background</b> Please describe the laws, regulations, policies and strategies of the Host Country that are of central relevance to the proposed project, as well as any other major trends in the relevant sector (e.g. any law/regulation on waste disposal or renewable energy targets)	<p>Fiji, like any other country in the region, is heavily dependent on imported fuel to meet a major component of its energy demand. As such, it is vulnerable to the continuous fluctuation of world crude oil prices.</p> <p>FEA's strategy is to replace most of the diesel burn with renewable energy sources by 2015. There is no specific roadmap for achieving the above target, but a strategy has been put in place identifying specific investments in various forms of local renewable energy sources that can be developed to achieve the above target. Hydropower shows a great potential to achieve the target among them. Such as the Wailoa Downstream, Upper Navua River and Nadarivatu.</p>
<b>Description of a typical CPA</b> (activities and measures to be covered, e.g. a MSW site or multiple MSW sites in a city)	Hydropower-based electricity generation and electricity supply to the grid
<b>Eligibility criteria for CPAs</b> (Define the eligibility criteria for inclusion of a project activity as a CPA under the PoA, which shall include, as appropriate, criteria for demonstration of additionality of the CPA, and the type and/or extent of information that shall be provided by each CPA in order to ensure its eligibility)	<p>The eligibility criteria for inclusion of a project activity as a CPA under the PoA shall cover the following list according to the EB 65 Report Annex 3: Standard for Demonstration of Additionality, Development of Eligibility Criteria and Application of Multiple Methodologies for Programme of Activities.</p> <p>(a) The geographical boundary of the CPA including any time-induced boundary consistent with the geographical boundary set in the PoA; Due to the boundary of PoA is Viti-Levu, Fiji, all CPAs are also located in Viti-Levu.</p> <p>(b) Conditions that avoid double counting of emission reductions like unique identifications of product and end-user locations; As Viti-Levu is served by national grid, the</p>

	<p>end users are Viti-Levu residents. All the designed CPAs will be integrated to the national grid. Therefore, there is no double counting of emission reductions.</p> <p>(c) The specifications of technology/measure including the level and type of service, performance specifications including compliance with testing/certifications; The proposed CPAs shall all compliance with National testing/certifications.</p> <p>(d) Conditions to check the start date of the CPA through documentary evidence; currently, the CPAs are under the feasibility study stage. Therefore, the start date of CPA is estimated as Jan/2014.</p> <p>(e) Conditions that ensure compliance with applicability and other requirements of single or multiple methodologies applied by CPAs; The detailed applicability and other requirements will be in consistent with the approved combination of methodologies.</p> <p>(f) The conditions that ensure that CPAs meet the requirements pertaining to the demonstration of additionality; In terms of demenstration of additionality, it will be carried out strictly with the requirements of Attachment A of Appendix B of the 'Simplified Modalities and Procedures for small-scale CDM project activities.</p> <p>(g) The PoA-specific requirements stipulated by the CME including any conditions related to undertaking local stakeholder consultations and environmental impact analysis; The PoA will carried out local stakeholder consultations and environmental impact analysis following relevant PoA-specific requirements, which will be carefully checked and stipulated by CME.</p> <p>(h) Conditions to provide an affirmation that funding from Annex I parties, if any, does not result in a diversion of official development assistance; there is no funding from Annex I parties.</p> <p>(i) Where applicable, target group (e.g. domestic/commercial/industrial, rural/urban, grid-connected/off-grid) and distribution mechanisms (e.g. direct installation); Target group is the domestic grid-connected energy users. The generated electricity will be distributed through national grid.</p> <p>(j) Where applicable, the conditions related to sampling requirements for a PoA in accordance with the approved guidelines/standard from the Board pertaining to sampling and surveys; N/A</p> <p>(k) Where applicable, the conditions that ensure that every CPA in aggregate meets the small-scale or microscale threshold criteria and remains within those thresholds throughout the crediting period of the CPA;</p>
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	<p>Each CPA will be strictly consisted with threshold criteria in approved methodologies.</p> <p>(l) Where applicable, the requirements for the debundling check, in case CPAs belong to small-scale (SSC) or microscale project categories. Debundling check will be strictly followed Appendix C<sup>1</sup> of the Simplified Modalities and Procedures for Small-Scale CDM project activities.</p>
<b>Methodology</b> (to be applied by all the CPAs)	AMS-I.D: the grid-connected installations
<b>Baseline Scenario</b> PoAs must result in GHG emissions being lower than "business-as-usual" in the Host Country. At the PIN stage questions to be answered are at least: <ul style="list-style-type: none"> <li>• Which emissions are being reduced by the proposed PoA?</li> <li>• What would the future look like without the proposed PoA?</li> </ul> <i>(About ¼ - ½ page)</i>	<p>CO<sub>2</sub> is the targeted emission reductions by the project activity.</p> <p>Fiji, like any other country in the Pacific region, is heavily dependent on imported fuel to meet a major component of its energy demand. The baseline scenario of the proposed project activity is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of existing grid connected power plants and by the addition of new generation sources. The baseline scenario of the proposed project is therefore the continuation of the practice prior to the start of the implementation of the PoA, i.e. supply of electricity from the FEA grid and addition of diesel generation capacity to the FEA grid to meet growing demand.</p>
<b>Additionality</b> Please demonstrate that in the absence of the CDM either: (i) the proposed voluntary measure would not be implemented, or (ii) the mandatory policy/regulation would be systematically not enforced and that non-compliance with those requirements is widespread in the country/region, or (iii) that the PoA will lead to a greater level of enforcement of the existing mandatory policy /regulation. This shall constitute the demonstration of additionality of the PoA as a whole;	<p>The renewable energy project will cost around FJ\$ 4.3 million per MW, however, the diesel power plant only cost FJ\$ 1.3-1.8 million per MW. Therefore, the financial/economic barriers are existed in Fiji. In the absence of the CDM, the proposed voluntary measure would not be implemented due to the cost is quite higher than conventional energy usage patterns.</p> <p>Currently, the proposed project will lead to a great level of enforcement of the existing policy. Such as Fijian Rural Electrification scheme and National Energy Plan.</p>

### C. Real Case CPA - Description, Type, Boundary and Schedule

<b>Title of the CPA</b>	Wailoa Downstream Hydropower Project
<b>Description of the CPA</b> <i>(Describe in not more than 5 lines)</i>	<p>The Wailoa CPA is a small-scale run-of-river hydropower plant in Fiji implemented by Fijian Electricity Authority (FEA).</p> <p>The Wailoa Downstream Hydropower Project is a project aimed at identifying and maximizing the potential for energy from hydropower projects based on the Wailoa river. Initial</p>

	assessment on the Wailoa CPA is still under feasibility study stage.
<b>Greenhouse gases targeted</b> CO <sub>2</sub> /CH <sub>4</sub> /N <sub>2</sub> O/HFCs/PFCs/SF <sub>6</sub> <i>(mention what is applicable)</i>	CO <sub>2</sub>
<b>Boundary of the CPA</b>	The project boundary is defined as the notional margin around a project within which the project's impact (in terms of carbon emission reductions) will be assessed. Therefore, the project boundary is Viti-Levu.
The boundary for the CPA in terms of a geographical area	Viti-Levu (Main island in Fiji)
<b>Crediting Period of the CPA</b>	
Starting Date	2013
Duration/Length	21 years
<b>Entity/individual responsible for the CPA</b>	
Name	Sustainable Energy Limited (SEL)
Role of the Entity/individual	Project participant
Organizational category	Joint venture between the Fijian Electricity Authority (FEA) and a hydro project developer, Pacific Hydro Limited (PHL)
<b>Eligibility of the CPA</b> (Justify why the CPA is eligible to be covered under the PoA)	According to the eligibility criteria of CPA defined in Section B above. The CPA is also located in Viti-Levu. It will be integrated to the national grid. Therefore, there is no double counting of emission reductions. All the specification of technology/measure will be complied with National testing/certifications. Currently, the CPAs are under the feasibility study stage. Therefore, the start date of CPA is estimated as Jan/2014. CME will check the start date of the CPA and documentary evidence. As the capacity of proposed CPA is 15MW which is small-scale and will apply the approved multiple methodologies. The PoA will carry out local stakeholder consultation and environmental impact analysis under the local official environmental regulation, which will be carefully checked and stipulated by CME. Currently, there is not any fundings for the PoA. The target group is domestic grid-connected energy users and all the generated electricity will be distributed through national grid.
<b>Baseline &amp; Additionality</b> Please demonstrate that in the absence of the CDM, the proposed CPA will not be implemented.	The baseline is continued expansion of capacity on the grid based on diesel generation plants. Construction of hydropower for electricity as the Wailoa and Navua projects is not an electricity market trend. The Project scenario is environmentally additional in comparison to the baseline scenario, and therefore eligible under the CDM to secure Certified Emissions Reductions (CERs). Pacific Hydro and FEA are therefore seeking carbon revenues through the CDM to help mitigate some, or all, of the risks.
<b>Expected Schedule</b>	
Earliest CPA starting date <i>Month/Year in which the plant/project activity will be operational</i>	Jan/2013
<b>Estimate of GHG Abated/CO<sub>2</sub> Sequestered</b> <i>In metric tons of CO<sub>2</sub>-equivalent, please attach calculations</i>	For the proposed 15 MW hydropower plant: Annual (if varies annually, provide schedule): <u>57,564</u> tCO <sub>2</sub> -equivalent Up to and including 2012: <u>    </u> tCO <sub>2</sub> -equivalent Up to a period of 10 years: <u>    </u> tCO <sub>2</sub> -equivalent Up to a period of 7 years: <u>402,948</u> tCO <sub>2</sub> -equivalent

	<p>The emission reductions estimation is based on the use of a registered project activity (Ref.0089) emission factor which is 0.656 kgCO<sub>2</sub>/kWh in Fiji main island Viti-Levu. Based on the FEA Details of Power Station &amp; Generating sets data the annual operation hours would be around 6500 hours per year on average and the efficiency is 90%.</p> <p>15MW*6500hours*0.656*0.9=57,564 tCO<sub>2</sub>e per year</p> <p>57,564*7=402,948 tCO<sub>2</sub>e in a period of 7 years</p>
<p><b>No double-counting</b> Confirm that the CPA is neither included in any other PoA nor registered as a CDM project</p>	Confirmed

## D. Finance

### D1. Finance at PoA Level

<b>Total Cost Estimate</b>	
Subsidies/incentives to the CPAs (if any)	__0__ US\$ million (Feasibility studies, resource studies, etc.)
Management/operational costs	TBD_ US\$ million (Property plant, equipment, etc.)
CDM transaction costs (PDD preparation, validation, registration etc)	TBD
Total costs at PoA level	<u>137.5</u> US\$ million (Feasibility studies, resource studies, etc.)
<b>Sources of Finance to Be Sought or Already Identified</b>	
<b>Public Funding and ODA</b> (In case public funding is used a confirmation that official development assistance is not being diverted to the implementation of the PoA)	N/A

### D2. Finance of the Real Case CPA

<b>Total Estimated Costs</b>	
Capital investment	Accroding to the registered POA PDD (Ref.0089), in Fiji, the total capital cost is US\$ 2.5 million/MW. Therefore, the 15MW hydro CPA will cost around US\$ 37.5 million.
Management/coordinating costs	TBD
Operational costs	Accroding to Fiji National Energy Security Situation Report-2010, the operational costs were US\$ 0.75/kW/year. Then, operational cost will be US\$ 11,250 per year for the 15 MW hydro CPA.
Other costs	TBD
Total	US\$ 37.83 million for 15MW hydro CPA.
<b>Sources of Funding</b>	N/A



Support from Coordinating/managing entity	N/A
Equity	TBD
Short-term debt	TBD
Long-term debt	TBD
Carbon finance (confirmed or estimated CER sales revenue, price per CER)	US\$ 8 – 10
Public fund (indicate whether public fund is used for the CPA or not. If yes, confirm whether any Official Development Assistance has been diverted for the implementation of this CPA)	None

**E. Expected Environmental and Social Benefits** (In Programmes of Activities CDM, Environmental Analysis can be conducted at PoA level or CPA level, subject to decision by the Coordinating/managing entity and the national regulations)

<p><b>ENVIRONMENTAL IMPACTS</b> E.g. impacts on local air, water and other pollution.</p>	<p>PoA level: At the PoA level, implementation of hydropower plant will not affect local air quality, as hydropower is only using the kinetic energy in the falling water. The Greenhouse Gas emission can be reduced significantly when compared it to the current situation.</p> <p>CPA level: At CPA level, the local environment and air quality will be remained. Meanwhile, the electricity that generated by hydropower plant will be supplied to Fijian National Grid.</p>
<p><b>SOCIO-ECONOMIC IMPACTS</b> What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project? Indicate the communities and the number of people that will benefit from this project. <i>About ¼ page</i></p>	<p>PoA level: One of the outcomes is that the hydropower plants will provided energy service in much cleaner method. The local staff employment will be increased. Another issue is that hydropower plant will help FEA to achieve the goal which is that supply the most cost effective electricity without scraficing the local environment.</p> <p>CPA level: In terms of local area benefits, more employments will be created and the relevant training will help the local staff to be more professional and reduce the operation and maintenance risk. For the enegy end-users, they will enjoy the service of clean energy and more stable electricity supply.</p>

<p><b>ENVIRONMENTAL STRATEGY/ PRIORITIES OF THE HOST COUNTRY</b></p> <p>A brief description of the project's consistency with the environmental strategy and priorities of the Host Country <i>About ¼ page</i></p>	<p>PoA level: According to Fiji National Energy Security Situation Report 2010, the proposed PoA is consistent with the strategic area 4: research, promotion and utilization of renewable energy applications in Fiji.</p> <p>CPA level: At CPA level, the demand of Fijian renewable energy will be satisfied.</p>
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