



# PROJECT IDENTIFICATION FORM (PIF)

PROJECT TYPE: Medium-sized Project

THE GEF TRUST FUND

Submission Date: 11 June 2010

## PART I: PROJECT IDENTIFICATION

GEF PROJECT ID<sup>1</sup>: PROJECT DURATION: 60 months

GEF AGENCY PROJECT ID:

COUNTRY(IES): Papua New Guinea (PNG)

PROJECT TITLE: PNG Energy Development Project

GEF AGENCY(IES): World Bank

OTHER EXECUTING PARTNER(S): DEPARTMENT OF PETROLEUM AND ENERGY, GOVERNMENT OF PNG

GEF FOCAL AREA (S)<sup>2</sup>: Climate Change

GEF-4 STRATEGIC PROGRAM(S): (see preparation guidelines section on exactly what to write) Strategic Objective 7; OP-6

NAME OF PARENT PROGRAM/UMBRELLA PROJECT (if applicable):

GPAS REGIONAL PROGRAM

INDICATIVE CALENDAR*	
Milestones	Expected Dates mm/dd/yyyy
Work Program (for FSP)	
CEO Endorsement/Approval	Dec 2010
Agency Approval Date	Feb 2011
Implementation Start	April 2011
Mid-term Evaluation (if planned)	
Project Closing Date	March 2016

\* See guidelines for definition of milestones.

## A. PROJECT FRAMEWORK

### Project Objective:

The overall development objective of the WB-supported PNG Energy Development Project is to develop the electricity sector framework and investment preparation activities to facilitate investment for strengthened, expanded, sustainable electricity supply.

The objective of the GEF-financed component is to provide the enabling framework and support information exchange and consensus-building, including policy, strategy and information on opportunities, essential to launch a national effort on development of renewable energy-based mini-grids.

Project Components	Indicate whether Investment, TA, or STA <sup>b</sup>	Expected Outcomes	Expected Outputs	Indicative GEF Financing <sup>a</sup>		Indicative Co-Financing <sup>a</sup>		Total (\$) c = a + b
				(\$) <sup>a</sup>	%	(\$) <sup>b</sup>	%	
1. Policy and strategy development, including to support launching of a national effort to develop renewable energy-based mini-grids. Financing from GEF will focus on the specific activities listed in Part II.	TA	Energy sector policies and supporting instruments (e.g. legal and regulatory) for renewable energy-based mini-grids in place.  Government, private sector and other entities with an interest in rural electrification understand the mechanisms,	Rural Electrification Policy and Strategy, Renewable Energy Policy and supporting instruments completed with high level of consensus-building.  Renewable resource assessments assembled and entered into GIS-based database for	829,091	35	1,530,000	65	2,359,091

<sup>1</sup> Project ID number will be assigned by GEFSEC.

<sup>2</sup> Select only those focal areas from which GEF financing is requested.

		benefits and support available for developing renewable energy-based mini-grids;  CO2 avoided through use of renewable energy (exact amount TBD during preparation)	renewable energy mini-grids in place.  Implementation of the Rural Electrification Strategy piloted through award of at least two renewable energy-based mini-grid concessions in accordance with the Rural Electrification Strategy.					
2. Preparation of the next hydropower project for Port Moresby through financial close	TA	tbd	tbd	0	0	2,500,000	100	2,500,000
3. Assistance to improve key aspects of PNG Power's efficiency	TA	tbd	tdb	0	0	1,000,000	100	1,000,000
4. Project management				80,000	35	150,000	65	230,000
<b>Total project costs</b>				909,091	15	5,180,000	85	6,089,091

<sup>a</sup> List the \$ by project components. The percentage is the share of GEF and Co-financing respectively of the total amount for the component.

<sup>b</sup> TA = Technical Assistance; STA = Scientific & Technical Analysis.

**B. INDICATIVE CO-FINANCING FOR THE PROJECT BY SOURCE and by NAME (in parenthesis) if available, (\$)**

Sources of Co-financing	Type of Co-financing	Project
Project Government Contribution	In kind	200,000
GEF Agency(ies)	IDA credit	4,980,000
Bilateral Aid Agency(ies)		
Multilateral Agency(ies)		
Private Sector		
NGO		
Others		
<b>Total Co-financing</b>		5,180,000

**C. INDICATIVE FINANCING PLAN SUMMARY FOR THE PROJECT (\$)**

	Previous Project Preparation Amount (a) <sup>3</sup>	Project (b)	Total c = a + b	Agency Fee
GEF financing	0	909,091	909,091	90,909
Co-financing		5,180,000	5,180,000	
<b>Total</b>		6,089,091	6,089,091	90,909

**D. GEF RESOURCES REQUESTED BY AGENCY (IES), FOCAL AREA(S) AND COUNTRY(IES)<sup>1</sup>**

<sup>3</sup> Include project preparation funds that were previously approved but exclude PPGs that are awaiting for approval.

GEF Agency	Focal Area	Country Name/ Global	(in \$)		
			Project (a)	Agency Fee (b) <sup>2</sup>	Total c=a+b
<b>Total GEF Resources</b>					

<sup>1</sup> No need to provide information for this table if it is a single focal area, single country and single GEF Agency project.

<sup>2</sup> Relates to the project and any previous project preparation funding that have been provided and for which no Agency fee has been requested from Trustee.

## **PART II: PROJECT JUSTIFICATION**

### **A. STATE THE ISSUE, HOW THE PROJECT SEEKS TO ADDRESS IT, AND THE EXPECTED GLOBAL ENVIRONMENTAL BENEFITS TO BE DELIVERED:**

The priorities in the Government of Papua New Guinea (GoPNG) in the energy sector are threefold, namely, increasing access to sustainable electricity supplies across the country; improving the reliability and quality of service; and creating an environment that is conducive to attracting the private sector to participate in new electricity generation and supply projects, especially focusing on PNG's considerable untapped renewable energy potential. To address these priorities, the Government of PNG is putting in place clear government policies for energy, electrification, and renewable energy. To implement these, it will also develop a rural electrification strategy. Finally, to meet immediate demand growth, it will begin to tap its hydroelectric potential. In addition, the Government is preparing a low carbon growth strategy to support development in line with the Climate Compatible Development Strategy currently under preparation. In the electricity sector, development of hydropower is expected to play a major role. An inter-agency working group has been established.

The WB has been requested by the GoPNG to undertake identification of the PNG Energy Development Project to help address the priority areas. The WB will provide technical assistance to the Department of Petroleum and Energy (DPE) in the following areas:

- Energy sector policies: The Rural Electrification Policy and Renewable Energy Policy and also the National Energy Policy. The Rural electrification and National Energy policies have been in draft for several years and would require review and updating. Work on the Renewable Energy policy has yet to begin. During further project preparation, an assessment will be made of the requirement to update or revise existing laws and regulations. To the extent that additional work is needed with respect to the legal and / or regulatory instruments in order to support implementation of the rural Electrification Strategy, and in particular to remove barriers to a renewable energy-based mini grid approach, technical assistance for such work will be incorporated in this component.
- Rural Electrification Strategy (RES) and related data gathering. The RES will be consistent with the approach outlined in the Electricity Industry Strategy (EIS). The EIS describes the approach to be adopted in situations where the supply of electricity to an area is determined to be non-financially viable without some subsidy. This is likely to be the case for many remote locations where renewable energy-based mini grids may be the least cost solution. The approach set out in the ESI is that the "State will subsidize through competitive tender the most efficient bidder, in particular in terms of the tender for the lowest amount of subsidy, to develop, own and operate the electricity infrastructure in the market. To move forward with this approach, a good database is required so that tenders can be properly defined and bidders can prepare informed proposals. Hence data gathering and creation of a database are critical pre-requisites for implementation of the RES. The data gathering could include remote satellite mapping to obtain data for rural electrification planning at sufficient scale to identify individual households in rural areas and to identify potential sites for mini to small hydro developments. The mapping would be used a basis for further studies to determine which households could be interconnected to the PNG Power grids, mini-grids, and supplement existing data on mini and small hydropower resource and enable renewable resource data to be matched to electric load data. It would be presented in GIS format and provide a major input to the nascent GIS coverage of PNG. Technical assistance in piloting the implementation of the tender process described in the ESI, and to be elaborated in the RES will be included in the project.

In addition, the WB has been requested to provide technical assistance to PNG Power in the following areas:

- Preparation of the next hydropower project for Port Moresby through financial close. This could include Environmental and Social aspects, technical studies, expertise in defining the structure of the project, transaction advisors for the selection of a project sponsor and for PNG Power’s participation; training and capacity building;
- Assistance to improve key aspects of PNG Power’s efficiency. This would allow PNG Power to make the best possible use of the new power supply while keeping the tariff as low as possible for customers. It could also help to make PNG Power a more credit-worthy of-taker for any new generation project.

**The Issue to be addressed by the GEF-financed component: Barriers to Development of Renewable Energy-based Mini-grids.**

Because of the geography and population distribution, electrification in PNG will likely proceed as a series of small, separate grids which may gradually be expanded. So in the context of PNG, “grid-based” must necessarily include both “main grid(s)” and smaller “mini-grids”. Mini-grid supply results in some benefits due to scale, compared to individual household systems. Also a better quality of electricity, suitable for supporting income-generating activities, is feasible. The combination of lower unit cost and potential for electricity to be used for income-generating activities makes a mini-grid system potentially more affordable and sustainable than individual household systems. Renewable energy sources will be an important factor in the sustainability of mini-grid systems, because of the cost and unreliability of diesel supplies. Although the benefits are widely recognized, a number of significant barriers to implementing renewable energy or renewable-diesel hybrid (which may be appropriate in locations where supply chains are more reliable) mini-grids remain.

Major barriers to development of renewable energy to supply mini-grids are discussed below.

1. Lack of Enabling Environment. To date PNG lacks a policy framework for the energy sector overall, and specifically for development of renewable energy and mini-grids in remote areas. Without this framework, there is a lack of clarity as to roles, responsibilities, obligations and consideration of subsidy, which makes it very difficult for a project developer – whether private sector, government or community – to design sustainable projects and to finance them.
2. Lack of Rural Electrification Policy and Strategy and very limited availability of information on opportunities. To significantly increase access to electricity will require more than the current *ad hoc* efforts. Currently there is no strategy for increasing access to electricity. While progress in developing the policies above will provide direction, a strategy will be needed as the basis for a coordinated effort across a range of stakeholders to increase access. A critical component of such a strategy will be the assembling of both resource assessments for renewable energy (small hydro, wind, etc.) and demand assessments (population databases) into a GIS data-base to facilitate the easy identification of electrification opportunities. Creation of such a database will be important in developing a strategy that takes into account actual needs and opportunities. The absence of good, consistent information represents a significant barrier to existing and new participants interested in the business of supplying mini-grid based electricity. The database and strategy serve as pre-requisites for moving from individual *ad hoc* pilot projects to systematic development of renewable energy-based mini-grids in PNG.
3. Affordability. The high costs of purchasing and transporting petroleum fuels to remote areas typically leads to a gap between what households and businesses can afford to pay and the actual costs of supplying electricity. Tapping renewable energy resources, particularly where good hydropower resources are available, represents a good opportunity to reduce the cost and hence make electricity more affordable in remote areas. Supply from mini-grids is likely also to be more affordable compared with stand-alone household systems, from the point of view of lower unit cost and also the possibility of using the better-quality electricity for income generation.
4. Institutional Arrangements. In PNG a variety of institutional arrangements have been tried, including private sector, local government, PNG Power and communities themselves. Given the size and diversity of PNG, it is likely that different institutional arrangements will be appropriate in different circumstances. The likelihood of success of any of them will improve by addressing the first three barriers above.

5. **Financing.** Although lack of financing can undoubtedly be a constraint in some cases, there currently exist a number of sources of financing and financing opportunities that could be tapped, including under the on-going, GEF-financed Sustainable Energy Financing Project. Lack of financing could become a significant constraint as the number of projects grows. However, in order to reach that growth, barriers relating to enabling environment, strategy and availability of information on opportunities, and affordability would need to be addressed first.

To date the GoPNG is receiving no assistance relating to the policy, strategy and information availability described above. In line with the approach laid out under GEF-4, the GEF-financed part of the proposed project will focus on creating a market environment in which renewable energy technologies and practices can diffuse into target markets – i.e. the barrier removal approach. Target markets will be communities, small towns and villages in areas remote from the main grids where mini-grids using renewable systems are appropriate. The proposed GEF financing, as an integral element of the overall WB-supported technical assistance project, would support activities designed to remove barriers to the development of renewable energy-based mini-grids, relating to policy, strategy and lack of access to information on project opportunities.

### **How the GEF MSP Project Seeks to Address the Issue**

The GEF-financed component of the overall project will address the issue of barriers to Development of Renewable Energy-based Mini-grids through support for activities to overcome the key barriers identified above, namely lack of enabling environment and very limited availability of information on opportunities and development mechanisms. Some or all of the following activities would be considered for GEF financing. The exact scope will be determined as project preparation proceeds.

- Development of the Rural Electrification Policy and Strategy, taking into account the benefits of renewable energy-based mini-grids;
- Development of the Renewable Energy Policy;
- Assembling all information on renewable energy resources in the country (including small hydro) and information on demand centers into a national GIS database of information necessary to identify and undertake preliminary preparation of renewable-energy based mini-grids;
- Assessment of renewable energy-based mini-grid experience in PNG as an input to the development of the Rural Electrification Strategy;
- Support for information exchange regarding success in sustainable development of renewable-energy-based mini-grids in other countries, through bringing practitioners from elsewhere to PNG to inform the discussions on development of policy and strategy;
- Consensus-building activities within PNG to facilitate ownership of the policies and strategies, and understanding of the mechanisms to develop renewable-energy-based mini-grids.
- Technical assistance to pilot implementation of the Rural Electrification Strategy through tender and award of at least two renewable energy-based mini-grid BOO schemes;
- Project management.

### **Global Environmental Benefits**

The global environmental benefits will result from implementation of a low carbon growth rural electrification strategy, supported by appropriate policies. While it is not possible to quantify the exact impact in terms of avoided carbon emissions, some scenarios can be considered. Assuming that the policy and strategy development contribute to an increase in access to electricity of 10% over 10 years and 20% over the next 10 years, avoided carbon emissions on the order of 100,000 TCO<sub>2</sub>/yr for the first 10 years and 200,000 TCO<sub>2</sub>/yr thereafter would be achieved if the increased access is based on renewable energy supply rather than on fossil fuel. A more detailed assessment of the potential GHG emission reductions will be undertaken by the time of CEO Endorsement.

### **B. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH NATIONAL/REGIONAL PRIORITIES/PLANS:**

The PNG Medium Term Development strategy recognizes the need for improved electricity supply and increase access to underpin the achievement of all other development objectives. The GoPNG is currently developing a Climate Compatible Development Strategy and the proposed project and objectives are fully in line with this strategy.

**C. DESCRIBE THE CONSISTENCY OF THE PROJECT WITH [GEF STRATEGIES](#) AND STRATEGIC PROGRAMS:**

The proposed project is fully consistent with the GEF strategic priorities which include a shift towards a programmatic approach, leveraging resources where possible through public-private partnerships and strengthening the link between environment and development. The Climate Change Focal Area Strategy and Strategic Programming for GEF-4 emphasize support for creating conducive policy environments in preference to individual investments. Specifically, the strategy focuses on creating a market environment in which technologies and practices can diffuse into target markets, i.e. the barrier removal approach.

The proposed project comes under the “mitigation” window with the focus on transforming the market development paths of countries into trajectories with lower GHG emissions in energy. The proposed project addresses the following Strategic Objectives in the Climate Change Focal Area of Strategic Program 3: Promoting Market approaches to Renewable Energy in grid-based systems.

The overarching goal for GEF-4 is to achieve a decrease in GHG emissions through market transformation. It is explicitly recognized that this is a long process, usually with the need for follow on investments beyond the GEF support. Incorporating the GEF funding (which supports integrating grid-based renewable energy into overall sector planning and reducing barriers to market development) into the larger project which includes support for public-private partnerships in implementing the energy sector plans, means that resources will be available to implement renewable energy and energy efficiency investments as the market transformation occurs. A cornerstone of the approach is that, because renewable energy will be part of the normal sector planning process, the full range of resources to support energy sector development will be available for renewable investments. This is in contrast to an approach where renewable energy and energy efficiency are targeted separately and as a result attract funding from a more limited pool of resources specifically earmarked for environmental or climate change mitigations activities.

**D. JUSTIFY THE TYPE OF FINANCING SUPPORT PROVIDED WITH THE GEF RESOURCES:**

A number of pilot projects aimed at renewable energy-based mini-grid supply have been or will soon be implemented. Several opportunities for financing of such projects are available, including from the private sector. A number of different institutional players are interested and ready to participate in implementation. The elements that are missing include policy framework, a national strategy and database of information needed to identify and develop opportunities for viable renewable energy-based mini-grid projects. The enabling actions by themselves do not generate a return, but have the potential to leverage significant resources if undertaken. Grant support from GEF resources is appropriate as a catalyst to attract and direct larger resources towards implementation of a GEF-supported policy and strategy.

**E. OUTLINE THE COORDINATION WITH OTHER RELATED INITIATIVES:**

The activities proposed for GEF-financing are an integral part of the overall WB-supported PNG Energy Development Project. The proposed GEF-financed component is fully in line with the on-going GEF-supported Sustainable Energy Financing Project (SEFP) which is currently on-going in PNG. Having a renewable energy and rural electrification policy and national strategy and a current database of renewable energy-based, mini-grid opportunities in place is expected to significantly increase the uptake of the financing facility available under the SEFP project. ADB is in the process of preparing a project to switch the supply of electricity in selected small towns from diesel-based to mini-hydro supplying isolated grids. Experience from this project will be important in the development of the national rural electrification strategy which will incorporate renewable energy-based mini-grid development. JICA has in the past provided assistance in assessing opportunities for mini-hydro opportunities and has recently undertaken a review of the electricity sector overall. The WB will work closely with both ADB and JICA to ensure that all available information is utilized for the development of the rural electrification database and that on-going support is well coordinated.

**F. DISCUSS THE VALUE-ADDED OF GEF INVOLVEMENT IN THE PROJECT DEMONSTRATED THROUGH INCREMENTAL REASONING :**

The absence of GEF funding would mean that many of the barriers to renewable energy-based grid supply would not be fully addressed or attention to these issues would be delayed until an alternative source of funding could be identified. In either case, the opportunity of integrating renewable energy and energy efficiency into overall sector planning could be lost. The value-added of the GEF funding is to facilitate integration of renewable energy into the normal energy sector policy and planning process together with targeted efforts to reduce the barriers to development of renewable energy-based mini-grids. This will mean that grid-based renewable energy investments will benefit from the full extent of resources available to implement energy sector development – not only limited funds ear-marked for GHG reducing initiatives.

**G. INDICATE RISKS, INCLUDING CLIMATE CHANGE RISKS, THAT MIGHT PREVENT THE PROJECT OBJECTIVE(S) FROM BEING ACHIEVED, AND IF POSSIBLE INCLUDING RISK MITIGATION MEASURES THAT WILL BE TAKEN:**

The main risk is that GoPNG prioritizes non-grant resources directly toward immediate investment based on the desire to have concrete outputs resulting from loans incurred. A major part of mitigating this risk to be able to quickly provide grant resources to address the critical policy, strategy and data requirements needed to support more effective, sustainable and low carbon growth development in the energy sector. Currently no other grant resources are available to fund the activities proposed for GEF-financing in this project. The risks of climate change on future renewable energy investments will be considered in the policy and strategy development.

**H. DESCRIBE, IF POSSIBLE, THE EXPECTED COST-EFFECTIVENESS OF THE PROJECT:**

As noted in the guidance provided in the paper “Cost Effectiveness Analysis in GEF Projects” from the June 2005 GEF Council meeting, interventions under the Climate Change Focal Area which focus on barrier removal cannot generally be meaningfully measured using quantitative estimates. Instead, the cost effectiveness is demonstrated by comparing alternative approaches to achieve the agreed barrier removal goal and identifying the approaches which will most efficiently achieve the objective. GEF-supported activities will be an integral part of development of a renewable energy-based access expansion approach for PNG. In addition to assessment of the technologies and investments, the opportunities, risks and risk mitigation measures associated with different models of financing and implementing mini-grid-based renewable energy will be also be considered. The resulting strategy will by definition be the most cost-effective approach to integrating renewable energy into efforts to expand access to electricity in PNG.

**I. JUSTIFY THE COMPARATIVE ADVANTAGE OF GEF AGENCY:**

The World Bank has strong experience in policy reform in the energy sector and specifically in the climate change focal area. The World Bank is ideally suited to be the implementing agency for the proposed project given its role as the executing agency for the GEF-supported Sustainable Energy Financing Project and preparation of the new GN Energy Development Project which will involve in-depth engagement with the Government on energy sector planning and implementation overall, with a particular focus on integrating grid-based renewable energy into the policy, regulatory and planning process.

**PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)**

**A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S):**

(Please attach the [country endorsement letter\(s\)](#) or [regional endorsement letter\(s\)](#) with this template).

NAME	POSITION	MINISTRY	DATE ( <i>Month, day, year</i> )
<b>DR WARI IAMO</b>	<b>Secretary</b>	<b>DEPT. OF ENVIRONMENT AND CONSERVATION</b>	<b>JUNE 8, 2010</b>

**B. GEF AGENCY(IES) CERTIFICATION**

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for project identification and preparation.

Agency Coordinator, Agency name	Signature	Date ( <i>Month, day, year</i> )	Project Contact Person	Telephone	Email Address
Steve Gorman, Executive GEF Coordinator, World Bank		June 11, 2010	Jiang Ru	202-473- 8677	jru@worldbank.org