




United Nations Development Programme
GLOBAL ENVIRONMENT FACILITY



Date: June 16, 1999

To: Mr. Kenneth King
Assistant CEO

Attention: Program Coordination

From:  Rafael Asenjo
GEF Executive Coordinator

Bentes (010)

Subject: Submission of Project Brief: "The Creation and Strengthening of the Capacity for Sustainable Renewable Energy Development in Central America" (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama)

Enclosed is a project brief entitled: "*The Creation and Strengthening of the Capacity for Sustainable Renewable Energy Development in Central America*" submitted to UNDP by: Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

Please note that the project has been endorsed by the GEF national operational focal point in each one of the above-mentioned countries. **Belize:** Ministry of Economic Development-MED; **Costa Rica:** Sustainable Development Foundation-FundeCooperacion; **El Salvador:** Ministry of Environment and Natural Resources-MARN; **Guatemala:** National Commission for the Environment-CONAMA; **Honduras:** Secretary of Natural Resources and Environment-SRNA; **Nicaragua:** Ministry of Environment and Natural Resources-MARENA; **Panama:** National Authority for the Environment-ANAM; In addition the Central American Commission for Environment and Development (CCAD) has endorsed the Initiative.

In accordance with the operational guidance for the preparation and approval of medium-sized projects, we are submitting this to the GEF Secretariat for action by the Chief Executive Office (CEO). We understand that the Secretariat will recommend to the CEO that the project be submitted to the Council for approval, that it be returned for revision or that it not be developed further.

We are simultaneously circulating copies to UNEP/GEF, World Bank/GEF, STAP and the UNFCCC Secretariat for comments to the GEF Secretariat. We expect to receive these comments within 15 working days. Therefore, we look forward to

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receiving the CEO's decision on or before July 22, 1999. But we understand that the project will not be formally approved, even if the CEO has endorsed it, until the Council has reviewed it within the following 15-day period, namely by August 12, 1999.

Thank you and best regards.

cc: Ahmed Djoghlaif, UNEP
Lars Vidaeus, World Bank
Madhav Gadgil, STAP
Rohit Khanna, UNEP/GEF
Mark Griffith, UNEP/STAP
Nick Remple, Regional GEF Coordinator
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UNITED NATIONS DEVELOPMENT PROGRAMME
GLOBAL ENVIRONMENT FACILITY
Medium-Sized Project Brief – Central America

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PROJECT IDENTIFIERS	
1. Project name: "The Creation and Strengthening of the Capacity for Sustainable Renewable Energy Development in Central America"	2. GEF Implementing Agency: <i>United Nations Development Programme (UNDP)</i>
3. Countries in which the project will be implemented: <i>Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama</i>	4. Country eligibility: <i>All indicated countries have ratified the UNFCCC</i>
5. GEF focal area(s): <i>Climate Change</i>	6. Operational Programme 6: <i>Promoting the adoption of renewable energy by removing barriers and reducing implementation costs</i>
7. Project linkage to national priorities, action plans, and programmes: <i>The Central American countries have ratified and fully support the objectives of the United Nations Framework Convention on Climate Change. Their governments are in the process of preparing the initial national communications. Given that there is an ongoing regional discussion on how to set up sustainable schemes to attend the energy needs of un-electrified people (50% of regional population), the countries are looking for programmes and projects designed to address abatement opportunities while supplying additional electricity and reducing the consumption of firewood. This situation is being tackled by government entities responsible for supporting rural electrification projects, and searching for feasible solutions to this problem. Some governments have begun massive rural electrification programmes through conventional (grid extensions) and non-conventional (solar home systems) means. In all countries, local NGOs, independently or with government or international assistance, have been sought to implement the sustainable solutions. Within this context, the development of capacity for sustainable renewable energy development is a desirable goal.</i>	
8. GEF national operational focal point and date of country endorsement (March/June 1999): <i>Belize: Ministry of Economic Development–MED; Guatemala: National Commission for the Environment–CONAMA; El Salvador: Ministry of Environment and Natural Resources–MARN; Honduras: Secretary of Natural Resources and Environment–SRNA; Nicaragua: Ministry of Environment and Natural Resources–MARENA; Costa Rica: Sustainable Development Foundation–FundeCooperacion; Panama: National Authority for the Environment–ANAM; In addition the Central American Commission for Environment and Development (CCAD) has endorsed the Initiative.</i>	
PROJECT OBJECTIVES AND ACTIVITIES	
9. Project rationale and objectives: <i>To create and strengthen the capacity for renewable energy project development based on regional cooperation and in-country linkages, thereby reducing greenhouse gas emissions by fostering small-scale renewable energy in Central America.</i> <i>Specific objectives are to remove institutional, informational, financial and technical barriers to:</i> i. <i>Increase access to basic energy services for people in rural areas</i> ii. <i>Use renewable energy sources to replace fossil fuels and reduce firewood consumption</i> iii. <i>Initiate discussions to facilitate the integration of global environment protection into the energy policies of the Central American political agenda.</i>	Indicators: 1. <i>CO₂ emissions.</i> 2. <i>The amount of people having access to electricity.</i> 3. <i>More RE projects are being developed.</i> 4. <i>Local communities, financial institutions, governments, international development and co-operation agencies, NGOs and private entrepreneurs invest in small-scale renewable energy.</i>
10. Project outcomes: 1. <i>Replicable experiences from eight RE demonstration projects, supplying additional energy</i> 2. <i>Innovative financial mechanisms and procedures for project investment established.</i> 3. <i>Business plans for thirteen RE projects submitted to financiers</i>	Indicators: 1. <i>Eight (8) demonstration projects that are operational and function as demonstration sites</i> 2. <i>Availability and accessibility to RE investment capital</i>

<p>4. A replicable training programme set up and undertaken.</p> <p>5. Regional organisations strengthened and potential new enterprises fostered.</p> <p>6. Increased awareness among government officials and integration of RE into national development policies.</p> <p>7. Local stakeholders capacitated to develop more RE projects.</p> <p>8. New investment funds mobilised toward this market niche.</p>	<p>11. Project activities to achieve outcomes (including Cost of each activity in US\$):</p> <p>1. Replicable Demonstration Projects: US\$137,420</p> <p>2. Feasibility Studies of Projects to be Financed: US\$211,735</p> <p>3. Strengthening Regional Institutional Capacity: US\$178,635</p> <p>4. Facilitating Availability and Access to Financing: US\$69,340</p> <p>5. Coordination for Dissemination and Replicability: US\$65,735</p> <p>6. Integrating Renewable Energy in Regional Policy: US\$62,135</p> <p>Indicators:</p> <p>1. Development of eight (8) demonstration projects (PV, micro-hydro, biomass and wind) results in replication for new sites and by new stakeholders.</p> <p>2. Thirteen (13) business plans for RE projects are submitted to financiers.</p> <p>3. More people are developing small-scale RE projects.</p> <p>4. Innovative financial mechanisms being used.</p> <p>5. More stakeholders are aware of RE possibilities.</p> <p>6. Policy makers consider renewable energy to be included in their policies.</p>	<p>12. Estimated budget: PDF-A: US\$ 25,000</p> <p>GEF: 725,000</p> <p>Co-funding: 796,430 (local stakeholders and governments)</p> <p>TOTAL: US\$1,546,430</p>	<p>INFORMATION ON INSTITUTION SUBMITTING PROJECT BRIEF</p> <p>13. Information on project proponents: Biomass Users Network, Central America Regional Office (BUN-CA), Tel: (506) 283-8835, Fax: (506) 283-8845; e-mail: biomass@sol.racsa.co.cr Contact Person: Jose Maria Blanco, Regional Director.</p> <p>14. Information on proposed executing agency (if different from above):</p> <p>15. Date of initial submission of project concept: March 3rd, 1998</p> <p>INFORMATION TO BE COMPLETED BY IMPLEMENTING AGENCY:</p>	<p>16. Project identification number:</p> <p>17. Implementing Agency contact person: Mr. Nick Remple, Regional GEF Coordinator UNDP/RBLAC, Tel: +1 212 906 5426 Fax: +1 212 906 6688</p> <p>18. Project linkage to Implementing Agency Programme(s): Climate Change enabling activities programme; Small Grants Programme; a PDF-B that deals with rural electrification by means of renewable energy sources is currently being implemented in Costa Rica; and FOCADDES (expected to be approved mid 1999) has the main objective to secure long-term financial resources for environmental activities in the Central American Region. The US\$15 million budget will be available to leverage investments in environmental activities, finance incremental costs, advance regional coordination and management of regional environmental projects. The portfolio to be developed under the proposed MSTP could be submitted to FOCADDES for consideration of co-financing activities.</p>
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1. Current Situation

1.1 Macro-economic Context

After decades of civil war, peace has finally been restored in the Central American region. The recently achieved peaceful environment and political stability have stimulated the regional economy. Within this process, traditional sectors of the economy, such as agriculture and industry, are becoming more competitive and therefore requiring access to more reliable energy sources.

The Central American region has increased its combined Gross Domestic Product (GDP) from US\$26,3 billion in 1990¹ to US\$48,0 billion in 1995, with most countries striving to achieve annual GDP growth rates of 4-5% (Table 1). The region has a total area of 512,420 km² and a population over 33 million.

It is expected that as a result of damages caused by hurricane Mitch in October 1998, especially in Honduras and Nicaragua, growth tendencies of these economies will be severely affected. Thus in 1999 GDP growth rate is expected to a mere 1.5% and 2.4% respectively for these countries ².

Table 1: Central American Indicators³

Country	Area (km ²)	Population (thousands)	Population Growth Rate (%)	GDP (millions US\$) (1995)	GDP Growth Rate (%) (1995)	Inflation Rate (%)
Belize	22,965	227	2.4	592	3.0	6.4
Guatemala	108,890	10,519	2.7	14,670	4.9	10.4
Honduras	112,090	5,981	2.5	3,900	3.6	30.0
El Salvador	20,935	5,924	2.0	9,500	6.0	10.0
Nicaragua	118,358	4,349	2.8	1,900	4.2	12.0
Costa Rica (1)	51,100	3,575	1.8	9,200	4.5	10.0
Panama	78,082	2,722	1.4	8,200	3.5	3.0
TOTAL	512,420	33,297		47,962		

(1) Costa Rican GDP growth rate is reported as an average for the period '90-'95.

As a result of increased prosperity and political stability, it is now a general trend that Central American countries have been able to turn their attention to their environmental problems. Governments, community groups, NGOs and the private sector, are increasingly aware of the extent of the region's environmental degradation and the need to address it.

1.2 Energy Context

In the Central American region, firewood is still the main energy source representing up to 50% of energy consumption at the regional level, mainly for consumption in the residential and commercial sectors⁴. In the short term it is expected that firewood will continue to be the main energy source for the Central

¹ International Monetary Fund. 1996. International Financial Statistics, Washington DC.

² Consejeros Económicos y Financieros S.A. (CEPSA), Government of Honduras, Mayorga & Asociados, AFOCOI. December 1998.

³ Sources: KPMG Latin America Country Profiles at <http://www.latinamerica.kpmg.com> (1997), U.S. AID, Environmental Markets in Central America, May 1997, SIECA, Sistema de Integración Regional, 1996.

⁴ FAO (1993) Análisis de la Contribución Forestal a la Producción de Energía en América Latina.

American rural population, especially for cooking. But firewood is not used only as an energy source for cooking, it is also intensively used in other traditional and emerging economic activities such as coffee, brown sugar, cement and limestone industries, as well as in artisanal brick production.

The Central American countries are under rapid and profound institutional transformations, including the restructuring of their respective energy sectors. At the same time, a relatively high rate of population growth (1,5-3%) and integration into a deregulated economic scheme, have shown that electricity demands throughout the region are increasing both in terms of power and energy, at annual rates exceeding 7-10 %.

It can be noted from Table 2 that on average, one out of every two Central Americans does not have access to electricity services. Unfortunately, the situation has recently worsened because of the damages caused by Hurricane Mitch as previously mentioned.

Table 2: Central American Energy Statistics

Country	Installed Capacity (MW)	Electricity Demand (GWh)	Per Capita Electricity Consumption (kWh/person)	Average Residential Energy Prices 300kW (US\$)	% Population with Access to Electricity (approx.)
Belize	34.5	90	692	0.2100	80
Guatemala	950.0	3,500	281	0.0800	36
Honduras	721.0	3,100	350	0.0844	51
El Salvador	910.0	3,250	479	0.0945	52
Nicaragua	393.0	2,000	271	0.0997	54
Costa Rica	1,075.0	4,200	1,271	0.0745	91
Panama	1,000.0	3,900	1,064	0.0945	90
Total/Average	5,083.5	20,040	496	0.1053	54.5

Sources: 1. USAID, Environmental Markets in Central America, May 1997 (adjusted for transmission losses).
 2. BUN-CA, An Overview of Sugar Cane Cogeneration in Six Central American Countries, 1997.
 3. Belize Chamber of Commerce and Industry - BCCI at <http://www.belize.org>

According to USAID and BUN-CA information⁵, power and energy production capacities in the region will need to almost double within the next 6-7 years, requiring the addition of over 3,000 MW of installed power capacity. The installed capacity and current electricity demand in Central America are of the order of 5,000 MW and 20,000 GWh, respectively. At the current consumption rates, this means that the region will have to increase its power capacity of the order of about 1,500 MW and 2,600 MW by the years 2000 and 2005 respectively.

Power generation from renewable energy sources has competitive advantages. As shown in Table 3, there is abundant renewable energy potential identified for the region at the pre-feasibility stage, this exceeding by far the anticipated 2,600 MW required by the year 2005. There is an aggregated potential of about 37,000 MW of hydro, 4,000 MW of geothermal and at least 350 MW from wind power plants, with a significant participation of small- to medium-scale projects. There is also a significant potential for

⁵ USAID. (1997) Environmental Markets in Central America;
 BUN-CA. (1997) An Overview of Sugar Cane Cogeneration in Six Central American Countries.

bagasse-based cogeneration, with a regional estimated capacity of at least 300 MW to be exploited in the short term.

Table 3: Technical Potential for Renewable Energy (MW)

Country	Hydro	Geothermal	Wind (1)	Bagasse-Based Cogeneration
Belize	80	–	20	N/A
Guatemala	10,890	200	50	149
Honduras	3,600	–	60	23
El Salvador	1,726	300	30	33
Nicaragua	5,050	2,200	80	79
Costa Rica	9,155	900	60	24
Panama	6,645	360	50	N/A
TOTAL	37,146	3,960	350	> 308

(1) Rough estimation of (commercially feasible) project sites under either exploitation or exploration.

Sources: 1. USAID, Environmental Markets in Central America, May 1997 (adjusted for transmission losses).
2. BUN-CA, An Overview of Sugar Cane Cogeneration in Six Central American Countries, 1997.

1.3 Institutional and Legal Issues

The Central American energy sector has radically changed during the 1990s at the institutional and legal levels, moving from state-owned electricity companies (generation, transmission and distribution) to a more open structure. In Guatemala, El Salvador and Panama a total opening with deregulation and open market competition has been set up as a result of recent legislation. Honduras and Nicaragua are still under a transitional period to transform their electricity sectors, while limited private participation still exists in Belize and Costa Rica. One common element for the region has been the relatively high rate of change.

These openings and changes in regulations have tended to stimulate private investments in the electricity sector. For example, annual investment in private power generation alone over the last couple of years has reached about US\$300 million, a figure that is expected to grow as institutional mechanisms become more straight forward and experience is gained in each country.

This scenario may be altered in the long run by the on-going Central American Electric Interconnection Project (known as SIEPAC), a project to develop a stronger and more competitive regional market for electricity, while improving the amount, reliability, and quality of the service. Grid-connected renewable energy projects in the region would eventually adjust to this new market and it is possible that projects will have to be concentrated in certain key geographical points in order to be strategically placed for effective delivery in this eventual regional interconnection.

Along with the decreasing role of governments in the energy sector, there is an on-going discussion of how to set up sustainable schemes which will attend the needs of un-electrified regions (mostly rural dispersed communities), by offering an opportune, reliable, economic and environmentally sound service.

In all the countries, local NGOs, independently or with government and international assistance, have been sought to implement solutions in order to provide electricity to the rural populations without access

to grid systems, as well as to implement different technologies in order to reduce firewood consumption. However, one common issue is the lack of innovative financial mechanisms to deal with the limited payment capacity of many end users and access financing sources to develop commercially sound projects.

2. Rationale and Objectives

The Central America region currently faces considerable challenges in the provision of energy to its population. On average, one out of every two Central Americans does not have access to electricity services, without accounting for all the damages caused by Hurricane Mitch in October 1998.

In most countries there have been rapid short-term additions of thermal plants in order to satisfy increasing energy requirements. Emissions of greenhouse gases produced by the Central American power sector (already at a level of approximately 0.36 million tonnes of CO₂ per year⁶) are thus likely to increase. This seems to be the trend in the region's expansion capacity, given that current demand is growing at an annual rate that exceeds 7-10%, and that thermal generation has turned out to be the immediate solution.

However, the small-scale renewable energy alternatives like micro-hydro plants, solar home systems and biomass-to-energy projects stand as feasible options for supplying additional energy services to the region (even more for the off-grid rural communities), which is endowed with significant local energy sources. Small-scale renewable energy projects present the following advantages in the Central American context:

- i. The time needed for the construction phase and the size of the initial investment are more suitable to the immediate features of the local project developers; and
- ii. Small-scale renewable energy projects for off-grid communities are likely to be more cost-effective than the newly privatised power utilities' and their lack of short-term profitability of grid extensions.

Traditional and alternative financing for renewable energy projects is available in the region, but this availability is under-utilised due to the lack of entrepreneurial capacity of many project developers interested in undertaking sustainable small-scale renewable energy projects.

The proposed Initiative is thus aimed at overcoming the barriers and reducing the implementation costs that prevent the development of Central American small-scale renewable energy projects and thereby modifying the trend of rising greenhouse gases emissions. This is consistent with GEF Operational Programme 6, "*Promoting the adoption of renewable energy by removing barriers and reducing implementation costs*". GEF support is required to remove the identified barriers by strengthening the capacity of energy end-users, decision makers, local community groups, public and private developers and financiers.

The main **Objective** of the Initiative is:

To create and strengthen the capacity for renewable energy project development based on regional cooperation and in-country linkages, thereby reducing greenhouse gas emissions by fostering small-scale renewable energy (RE⁷) in Central America.

Specific objectives are to remove institutional, informational, financial and technical barriers to:

- i. Increase access to basic energy services of a greater number of the Central Americans, but mainly those in rural areas without access to electricity and reliable energy services for productive uses.
- ii. Use renewable energy sources to replace fossil fuels for small-scale electricity generation and – to a lesser extent – substitute and reduce the consumption of woody biomass, thereby decreasing local environmental degradation.

⁶ This figure is a rough estimation by BUN-CA.

⁷ To avoid repetition, hereinafter *renewable energy* will be abbreviated as RE.

- iii. Initiate discussions to facilitate the integration of (global) environmental protection into the energy policies of the Central American political agenda.

It has been estimated that through the implementation of the 21 individual projects proposed under this regional Initiative, CO₂ emissions could be reduced at least by 90,000 tonnes in 20 years (this figure does not take into account additional reductions resulting of the replication of similar projects)⁴.

3. Identification of Barriers Preventing RE Development in Central America

During the implementation of UNDP's Project Development Facility (PDF-A), BUN-CA carried out an assessment through national meetings and workshops in the seven countries, in order to identify the barriers that prevent the development of small-scale RE projects in the region. Findings showed that there have been positive changes at the institutional and legal levels, and that financing is available for the development of renewable energy projects. However, in spite of this, barriers to increase the use of renewable energy throughout the region still remain, and can be classified as follows:

Institutional Barriers:

- i. The uneven geographical distribution of engineering consulting and construction companies and technology suppliers in the region does not facilitate a broad access to small-scale renewable energy technologies in the region.
- ii. For off-grid rural communities seeking electrification using small renewable energy technologies, the organisational structure needed to guarantee access to financing, and to assure the adequate maintenance of the equipment throughout time is either not clear or non-existent.
- iii. Entrepreneurial attitudes and business-like thinking is relatively new to the Central American energy sector, which is transforming from a stated controlled energy monopoly to a wholesale power market.
- iv. With the change from a state-owned electricity sector to a privatised open market, there is no guarantee of improved access to energy. The investment costs of grid extensions by conventional means are prohibitive for dispersed rural populations.
- v. In the transition to an open market, conditions will favour those private generators who are able to put projects on-line more rapidly and with lower initial investment costs (as is the case for internal combustion diesel and fuel oil generators).
- vi. In some countries, the legal and institutional frameworks to regulate private power investments are still in-progress.
- vii. At the decision making level, there is a limited interest on small-scale renewable energy projects, and this sort of projects are not integrated into the expansion plan of power capacity.

Informational Barriers:

- viii. There is limited access to information on small-scale renewable energy technologies and project-cycle development.

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	Number of projects	MW 'installed' or GJ's	Tonnes of CO ₂ in 20 years
Wind	1	3	15,137
Hydro	8	3.9	39,054
Biomass	4	7.7 und 4,800 GJ	37,760
PV	6	0.021	34
Solar Thermal	2		

- ix. There is limited knowledge of potential markets for small-scale renewable energy, current existing needs for rural electrification, and the relative ability to pay of the (rural) energy end-users.
- x. Information on lessons learned and methodologies to evaluate and monitor renewable energy experiences are not available in an accessible way.
- xi. Little existing data on micro and small hydro resources, and small-scale wind power applications.

Technical Barriers:

- xii. The supply of small-scale renewable energy technologies is still an emerging business in Central America, and after sales and maintenance services are both costly and ineffective.
- xiii. There is a lack of qualified human capacity to design, install, operate, manage and maintain small-scale renewable energy schemes.
- xiv. There is a lack of local skills and manufacturing facilities to produce and maintain spare parts.
- xv. In some countries, even though there are engineering/consulting firms with adequate technical background, there is a lack of experience in the development of small-scale renewable energy projects.

Financial Barriers:

- xvi. Most of the few technology suppliers do not see the potential of renewable energy. It is thus not a major component of their business activities, they are extremely risk-averse, so they simply have insufficient marketing experience.
- xvii. The capacity of commercial financial institutions and local development banks to evaluate small-scale, RE projects is limited or non-existent. Non-reimbursable 'investments' are often earmarked and to date very little have been earmarked for regional off-grid rural electrification.
- xviii. There is limited payment capacity in rural areas because of the high poverty level. Small-scale, renewable energy technology investments require high initial cost, which are not often feasible for low-income sectors of society. Credit alone would not assure the access of energy services to the poorest sectors.
- xix. Traditional financing is not focused on small-scale renewable energy projects. Even though dedicated financing is available in the region, it is under-utilised due to the lack of experience in drawing up sound business plans and a lack of financial mechanisms suitable for small-scale RE projects.
- xx. There has been a trend among foreign donors to support some community groups and NGOs on a project basis, creating dependence that limits the ability of these stakeholders to undertake fund raising in the long term. Thereby reducing the sustainability of the institutional set-up required to design, implement, monitor and evaluate renewable energy projects.
- xxi. Although credit facilities are available in remote rural areas through some NGOs with experience in "on-lending" micro-credit, their intermediation costs are very high (of the order of 10-15%).

4. Expected Outcomes

After two years it is expected that the Initiative will have produced the following outcomes:

1. **Replicable experiences of sustainable energy solutions** created and disseminated by implementing eight demonstration projects in seven countries for productive uses and to service off-grid communities with different renewable alternatives.
2. **Innovative financial mechanisms** and the required procedures for making available investment capital established, as a result of the process of preparing thirteen projects in the form of business plans.
3. **A training programme** designed and implemented with participation of local governments, performed by local, regional and international consultants, which could be replicable elsewhere.

4. **Regional organisations strengthened** and potential new enterprises fostered through linkages created between financiers, developers, engineering services, and regional technology suppliers.
5. **Government officials aware of the benefits of using renewable energy** and interested to integrate RE into national development policies and plans.
6. **Stakeholders capacitated**, encouraging the development of more RE projects in the long term.
7. **New investment funds mobilised** toward this market niche.

5. Activities and Financial Inputs Required

On-the-job training will be included to the extent possible as the main approach for human capacity building. The above mentioned outcomes will be achieved through the implementation of the following activities:

Activity 1: Replicable Demonstration Projects

Through the implementation of **eight demonstration projects** in the seven countries, small-scale RE projects will be validated as improved options for satisfying energy needs with lower life-cycle costs, while promoting a greater utilisation of the region's existing potential. In addition, the implementation process and future replication of these demonstration projects will lead to the identification of key themes for the training programmes, and the identification of financing and policy actions required to overcome the identified barriers. Project developers will implement these demonstration projects in order to validate different technologies in each of the seven Central American countries. The demonstration projects include photovoltaic modules for lighting, water pumping, water heaters and solar dryers, and micro-hydro power plants. Feasibility studies (Activity 2) include, in addition, wind and biomass to energy technologies (electricity cogeneration from sugarcane bagasse, biogas (electricity) in coffee processing facilities, and sawmill power generation).

The total cost of this activity is US\$743,850. Of this total, GEF is requested to provide US\$137,420. The different Central American stakeholders and selected project proponents commit the additional funding for this activity, US\$606,430.

Activity 2: Feasibility Studies of Projects to be Financed

This activity together with Activity 1 will furnish the specific elements needed in the elaboration of the agenda for the training programmes. Furthermore it will contribute towards adapting loan and investments conditions to specific project characteristics, and deal in raising awareness on public policy and legislation. Undertaking the selected **thirteen detailed feasibility studies** will assist in identifying what is needed at the very early stages of the project cycle (pre-investment). A very close working relationship with potential financiers will be fostered from the outset of this activity. Through the carrying out of feasibility studies, and the drawing up of business plans for the different projects, the lack of capacity of the regional stakeholders for accessing the available financing will be addressed.

The cost of this activity is US\$366,735. Of this total, GEF is requested to provide US\$211,735, with local entrepreneurs and other stakeholders contributing the difference of US\$155,000. It is estimated that a total capacity in the amount of 9.7 MW (4.2 MW biomass, 3.0 MW wind and 2.5 MW hydro) will be installed. It is estimated that this entails a total investment of US\$14.3 million (US\$6.3 million for biomass, US\$3.6 million for wind and US\$4.4 million for hydro). Thus a US\$211,735 GEF contribution is expected to facilitate investments in the amount of US\$14.3 million.

Activity 3: Strengthening Regional Human and Institutional Capacity

The strengthening of the institutional capacity of emerging regional stakeholders that are working or are willing to insert renewables into their working agenda is necessary in order to overcome the identified barriers. The approach will consider the distinction between grid-connected and stand-alone systems in order to address the different needs of the stakeholders. The Initiative will undertake seven national workshops, to enable stakeholders to develop national projects. These will bring together government and utility officials, NGOs, private entrepreneurs and financial institutions, as well as representatives of international development and co-operation agencies, consultants and technology suppliers.

Each workshop will include a review of basic concepts and "hands-on" training sessions, covering the following topics:

- roundtable discussions to analyse the nation-specific institutional, informational, financial and technical barriers that prevent or inhibit the adoption of small-scale renewable energy solutions;
- how to select the most appropriate technology for a specific energy need (interconnected and off-grid energy supply for productive uses);
- how to evaluate the potential of specific technologies (micro-hydro, photovoltaic, wind, biomass);
- hands-on practice in developing a business plan for enterprise development and financing; and
- conclusions and the identification of next steps to be taken.

A minimum cash amount of US\$5,000 per country will be cost-shared from government agencies in the context of their rural development and/or environmental objectives, that will be used to finance conference facilities, logistics, etc. as well as in-kind contributions related to the in-country workshops. This activity costs US\$213,635, thus requiring US\$178,635 GEF financing in addition to US\$35,000 local cash contributions.

Activity 4: Facilitating Availability and Access to Financing

The nature and sequence of the previous activities are designed to establish - in parallel - a pipeline of RE projects into the investment portfolio of interested financiers. The Initiative will coordinate the participation of local banks and regional and foreign financing entities in technical meetings in order to introduce the project portfolio being developed by the Initiative. By involving "conventional financiers" as well as those with a more social orientation in the workshops, and by mobilising new donors or co-funding resources, a set of financial options will be adapted to the needs of grid-connected and stand-alone project developers.

The cost of undertaking this activity addressing the problem of the limited availability of information and familiarity with financing is US\$69,340. In the absence of GEF technical assistance it is expected that such activities would not take place.

Activity 5: Coordination for Dissemination and Replicability

Activities 1 and 2 (feasibility studies, design and implementation of demonstration projects) need to be closely monitored and evaluated to ensure smooth and efficient operation and provide feedback to earlier stages in the project cycle. The Initiative will provide feedback to the different activities in the seven countries on the findings resulting from various stages of project development (implementation, feasibility, training and negotiation) by means of a networking process. The Initiative will coordinate meetings, and facilitate the management and exchange of information among the participants in each country who are interested in expanding their actions and working connections within the region. The creation of linkages between the different stakeholders will be pursued with the help of written materials (letters of inquiry, technical information about technologies, energy and environment reports, and specific assessments), modern communications (fax, Internet), by training sessions and negotiation meetings. A bi-monthly two-page newsletter in Spanish will also be published and distributed.

These activities would not be carried out without GEF technical assistance and therefore considered incremental costs. Calculated costs are US\$65,735 being required from GEF.

Activity 6: Integrating Renewable Energy into Regional Policy

With the approval of the Initiative and its in-country projects by the GEF-Operational Focal Points at the government levels a start has been made with this activity. With regard to the required appropriation, the design of this activity embraces the flow of information and policy maker participation in on-going

activities, and will be focussed on ministries, national energy authorities, relevant government officers and legislative energy commissions. A permanent roster of the main contacts will be available from the regional coordinator. Activity 6 will endeavour to demonstrate the benefits of a regional trend to foster and develop renewable energy in the following aspects:

- social (integrate isolated communities by accessing sustainable energy services),
- economic (reduce fossil fuel imports, promote public investment, increase rural production/economic growth), and
- environmental (sustainable use of local resources, reduce local pollution, contribute to lessening global warming, preserve forest resources, etc.).

It is intended to capture the interest and support of key decision-makers, in order to foster the binding of local and regional policies through consultation and meetings with local governments and other authorities. Background papers to facilitate these discussions will be prepared as appropriate.

In the absence of GEF assistance, it is expected that this activity would not take place, thus the estimated cost of US\$62,135 is considered as the GEF contribution.

6. Sustainability of the Initiative

The long-term sustainability of the project will be enhanced through:

- i. the activities related to changes in public policy and spending, resulting in a more favourable governmental context for small-scale renewable energy development
- ii. facilitating availability and access to financing
- iii. increased human and institutional capacity for design, development, implementation, monitoring and evaluation of renewable energy projects
- iv. dissemination of the "hands-on" training experience and the know-how of RE project development
- v. regional linkages/networks, with the strong commitment of developers, organisations and communities involved in the selected projects, as well as the support of the Central American Commission for Environment and Development (CCAD)
- vi. a gradual reduction of total investment costs of future small-scale renewable energy projects as economies of scale are achieved in combination with improved supply infrastructure

7. Risks

One of the main risks of the Initiative lies in the possibility of not obtaining sufficient commitment at the government level in the different countries. The Initiative will facilitate discussions with the relevant public institutions such as ministries of energy and environment, energy commissions, and will foster public involvement in activities designed to overcome existing financial barriers and promote the reformulation of pertinent national policies.

There is also a risk associated with the fact that the results of some of the feasibility studies to be carried out could show that selected projects are not either technically or financially feasible. This risk has been mitigated through careful selection of 13 projects to be developed for follow-up financing from a list of over 100 submitted project profiles. In addition the selected projects have already substantial local financial resources allocated for co-financing by project promoters and/or entrepreneurs, which is a strong indication of financial feasibility of the selected projects.

Another risk is associated with the level of environmental awareness of local investors and engineering firms, and their limited expertise in inserting renewable energy development into daily operations and decision-making processes. This risk will be mitigated through the dissemination of relevant information through workshops and a bi-monthly newsletter.

8. Stakeholder Involvement Plan

Stakeholder Identification

BUN-CA identified a series of key participants among UNDP country offices, GEF operational focal points, government agencies (at national and municipal levels), financial institutions and development agencies, utilities, NGOs, private entrepreneurs, technology suppliers, and energy end-users during the implementation of the PDF-A. These stakeholders are already involved and interested in the development of small-scale interconnected and off-grid rural renewable energy projects. The networking process, ensuring the effective involvement of the different stakeholders and in accordance with the activities described above, has thus already been initiated.

Information, Dissemination and Consultation

The structure of the Initiative addresses the dissemination of lessons learned, information and experience gained. The dissemination effort will be implemented by means of workshops, the publication of a bi-monthly newsletter and specific technical reports and handouts. Seven national workshops will be held with a multisectoral representation of the above-mentioned stakeholders and an ongoing consultation process with local groups.

Social and Participation Issues

By ensuring true community empowerment by addressing training and education, and increased income generation and incentives to promote cash savings it is expected that the implementation and replication of activities will have an impact on the region.

9. Incremental Cost Matrix and Incremental Cost Analysis

The goal sought by this Initiative is to strengthen the regional capacity in seven Central American countries to foster the regional development of small scale RE technologies by removing informational, institutional capacity, technical and financial barriers.

The lack of an integrated regional approach to overcome these barriers impedes the sustainable development of the indigenous renewable energy sources and limits the access to existing sources of conventional and non-conventional financing in the national, regional and international markets. The project costs to GEF include the costs of developing a regional training programme, enhance a favourable financial and policy context for RE development and funding the incremental costs of selected projects to validate at the regional level the use of alternative energy sources.

In a business-as-usual scenario, there will remain a lack of regional human and institutional capacity. Due to the high transaction costs involved, no single government or any other regional organization has thus far taken the initiative of establishing an integral and regional system for the promotion of sustainable, small-scale renewable energy sources. The baseline is defined by the lack of effective links between project developers or end-users with suppliers of technology, consulting firms, and financial institutions on renewable energy. There is also a lack of knowledge and dissemination of some successful small-scale renewable energy projects already executed throughout Central America.

Six activities have been designed to remove institutional, informational, technical and financial barriers that hamper the development of small-scale RE applications. In summary the Initiative takes on the role of a much needed RE development broker between end-users, financiers and RE technology providers. In addition it targets activities to improve the policy context in which this brokering is taking place. Capacity is being built to take up this broker role after the Initiative has ended. All of the incremental costs requested are related to the costs of removing the barriers identified. The incremental costs of each activity are briefly summarised in the following matrix:

Incremental Cost Matrix

Activity Number	Baseline (B)	Alternative (A)	Increment (A-B)
1. Replicable Demonstration Projects	Fossil fuel based electricity supply	Validation of RE for satisfying energy needs	Decreased CO ₂ emissions as a direct result
Global Environmental Benefits	Lack of small-scale RE projects	A greater utilisation of the potential for RE	A reduction of fossil fuel consumption
Domestic Benefits	Isolated communities without electricity	RE based electricity for isolated communities and off-grid uses	RE supplying domestic and productive energy needs at the local level
Costs	\$606,430	\$743,850	\$137,420
2. Feasibility Studies of Projects to be Financed	Lack of successful small-scale RE projects within the region	Substitution of thermal generation through the utilisation of local RE sources	Validation of innovative mechanisms for overcoming existing barriers
Domestic Benefits	Small-scale RE supply seems unaffordable	Feasibility of small-scale RE projects verified and validated	New projects at the investment stage responding to the local demand of power
Costs	\$155,000	\$366,735	\$211,735
3. Strengthening Human and Institutional Capacity	Lack of institutional capacity for RE project development	Capacity built for implementing innovative RE project pipeline	Capacity strengthened for the preparation of RE project proposals
Global Environmental Benefits	Ignorance of economic and environmental advantages of RE	Acknowledgement of the global effects of the RE power generation	Increased commitment of local stakeholders to invest in RE projects
Domestic Benefits	Inability to utilise their local energy sources	Utilisation of their potential of RE sources	Capacity created for identifying local projects
Costs	\$35,000	\$213,635	\$178,635
4. Facilitating Availability and Access to Financing	Lack of technical knowledge among the finance sector	Financiers able to analyse RE projects	Available finance to be used by stakeholders
Global Environmental Benefits	RE projects do not have adequate loan conditions	Loan conditions adapted	New sources of financing to be available for RE initiatives
Domestic Benefits	Business opportunities wasted or unknown	Participation of private sector and NGOs	New plans to supply isolated regions with RE
Costs	-0-	\$69,340	\$69,340
5. Coordination for Dissemination and Replicability	Lack of effective links between technology suppliers, end-users and consulting firms	Additional stakeholders realise advantages of RE projects	The learning curve of doing projects enriches the innovative financing and policy making efforts
Domestic Benefits	Isolated stakeholders are unable to develop energy solutions for local needs	Links established for replication of projects	New initiatives emerge to cope with the existing energy needs
Costs	-0-	\$65,735	\$65,735
6. Integrating RE in Regional Policy	Global environment protection not integrated into energy policies	Political interest and support captured to foster RE through policy	RE promotion integrated in the political agenda of Central America
Global Environmental Benefits	Low penetration of electricity in rural areas and limited participation of private/NGO sectors	Better quality electricity supply in terms of reliability and affordability	A larger population with access to energy services
Domestic Benefits			Emerging new productive uses of energy
Costs	-0-	\$62,135	\$62,135

TOTAL PROJECT	CO ₂ emissions growing as energy demand does	Decreased CO ₂ emissions due to the new RE power generation	A decreasing trend in CO ₂ emissions in Central America (90,000 tons)
Global Environmental Benefits	Barriers prevent the penetration of clean sources of energy	Gradual substitution of fossil-fuel power generation	Barriers removed to institutional capacity and financing
Domestic Benefits	50% of population without access to electricity Heavy petroleum bills	A greater and potentially growing energy supply Low long-term cost for energy from local source	Greater access to energy services for population Important savings in local public finances
Costs	US\$796,430	US\$1,521,430	US\$725,000 GEF

The matrix shows that an investment of US\$750,000 (MSP+PDF) in barrier-removing activities will produce, in addition to other domestic benefits, global benefits of about 90,000 tons of CO₂ in the short term, implying an initial cost ratio of US\$8.33 per ton of CO₂. Over time this ratio is expected to decrease as new renewable energy projects continue to emerge as a result of this regional initiative.

10. Budget by Input

Table 7 shows the proposed budget for the completion of this proposed Initiative within a period of 2 years.

Table 7: Budget in US\$

Component	GEF	Other Sources	Totals
<i>PDF - A</i> (UNDP)	25,000		25,000
Personnel: Regional consultants	187,025		187,025
Subcontracts: Regional/International	220,400	155,000 (9)	375,400
Training	122,500	35,000	157,500
Equipment	77,685	606,430 (9)	684,115
Travel	50,000		50,000
Mission evaluation(s)	10,000		10,000
Miscellaneous	34,890		34,890
Project Support Services (3 %)	22,500		22,500
Project total:	750,000	796,430	1,546,430

(9) These are committed "in cash" funds from regional stakeholders engaged during the PDF-A activities.

11. Project Implementation Plan

The project will be nationally executed (NEX), but will have a regional coverage as activities are concerned. CCAD (Central American Commission on Environment and Development), that represents the Ministries of Environment of the seven Central American countries, has endorsed the project as well as the GEF focal points of the individual countries in which project execution will take place.

A programme management unit (PMU) will be set up to manage the implementation process and provide technical inputs related to the implementation of the proposed activities. The PMU will be located in Costa Rica and work closely with the Costa Rican UNDP office for administration of the project as well as with local UNDP representation in the other six countries for implementation of the work plan, including the 21 individual projects. A close working relationship between the UNDP office in Costa Rica and the other UNDP offices in the other six countries will be fostered, such that the administrative