

# COVER NOTE

**PROJECT TITLE: RENEWABLE ENERGY FOR ELECTRICITY GENERATION-RENEWABLE  
ELECTRIFICATION OF THE GALAPAGOS ISLANDS  
DATE: 24-10-2001**

	<b>Work Program Inclusion</b>	<b>Reference/Note:</b>
<b>1. Country Ownership</b>		
<ul style="list-style-type: none"> <li>Country Eligibility</li> </ul>		Cover page (Ratified UNFCC March 21,1994)
<ul style="list-style-type: none"> <li>Country Drivenness</li> </ul>	Clear description of project's fit within: <ul style="list-style-type: none"> <li>National reports/communications to Conventions</li> <li>National or sector development plans</li> </ul>	<ul style="list-style-type: none"> <li>Paragraphs 5, 6, 7 and 8</li> </ul>
<ul style="list-style-type: none"> <li>Endorsement</li> </ul>	<ul style="list-style-type: none"> <li>Endorsement by national operational focal point.</li> </ul>	Endorsement Letter dated September 26 <sup>th</sup> , 2001 attached
<b>2. Program &amp; Policy Conformity</b>		
<ul style="list-style-type: none"> <li>Program Designation &amp; Conformity</li> </ul>	Describe how project objectives are consistent with Operational Program objectives or operational criteria.	Paragraphs 14, 15, 16 and 22
<ul style="list-style-type: none"> <li>Project Design</li> </ul>	Describe: <ul style="list-style-type: none"> <li>Sector issues, root causes, threats, barriers, etc, affecting global environment.</li> <li>Project logical framework, including a consistent strategy, goals, objectives, outputs, inputs/activities, measurable performance indicators, risks and assumptions.</li> <li>Detailed description of goals, objectives, outputs, and related assumptions, risks and performance indicators.</li> <li>Brief description of proposed project activities, including an explanation how the activities would result in project outputs (in no more than 2 pages).<sup>1</sup></li> <li>Global environmental benefits of project.</li> <li>Incremental cost estimation based on the project logical framework</li> <li>Describe project outputs (and related activities</li> </ul>	<ul style="list-style-type: none"> <li>Paragraphs 2, 3, 14, 15 and 22</li> <li>Paragraphs 27 to 52 and Annex B</li> <li>Paragraphs 27 to 52 and Annex B</li> <li>Paragraphs 29, 30 and Annex B</li> <li>Paragraphs 20 , 21, 61, 63 and cover-page and Annex A</li> <li>Paragraphs 59, 60 and Annex A</li> <li>Paragraphs 61, 63, cover-page</li> </ul>

<sup>1</sup> A project/program could undertake detailed design (specification of project outputs) during the first phase of implementation, with clear benchmarks for approval of the subsequent phase. A project could also be an adaptable program loan with several phases, where achievement of the clear benchmarks at the end of each phase is a necessary condition for approval of the next phase. In such projects, describe in detail the project output for the first phase and describe briefly the project activities for that phase.

	<b>Work Program Inclusion</b>	<b>Reference/Note:</b>
	<p>and costs) that result in global environmental benefits</p> <ul style="list-style-type: none"> <li>• Describe project outputs (and related activities and costs) that result in joint global and national environmental benefits</li> <li>• Describe project outputs (and related activities and costs) that result in national environmental benefits</li> <li>• Describe the process used to jointly estimate incremental cost with in-country project partner</li> <li>• Present the incremental cost estimate. If presented as a range, then brief explanation of challenges and constraints and how these would be addressed by the time of CEO endorsement</li> </ul>	<p>and Annex A</p> <ul style="list-style-type: none"> <li>▪ Paragraphs 62, 64 and Annex A</li> <li>▪ Annex A and B</li> <li>▪ Negotiation with national institutions</li> <li>▪ Incremental cost addressed in paragraphs 25, 26, 59, 60 and Annex A</li> </ul>
<ul style="list-style-type: none"> <li>• Sustainability (including financial sustainability)</li> </ul>	Describe proposed approach to address factors influencing sustainability, within and/or outside the project to deal with these factors.	<ul style="list-style-type: none"> <li>• Paragraphs 47, to 50, 56 and 69</li> </ul>
<ul style="list-style-type: none"> <li>• Replicability</li> </ul>	Describe the proposed approach to replication,(for e.g., dissemination of lessons, training workshops, information exchange, national and regional forum, etc) (could be within project description).	<ul style="list-style-type: none"> <li>• Paragraphs 16, 22 43, 45 and 52</li> </ul>
<ul style="list-style-type: none"> <li>• Stakeholder Involvement</li> </ul>	<ul style="list-style-type: none"> <li>• Describe how stakeholders have been involved in project development.</li> <li>• Describe the approach for stakeholder involvement in further project development and implementation.</li> </ul>	<ul style="list-style-type: none"> <li>• Paragraphs 48, 52 and 53</li> <li>• Successful implementation will have created partnership and further development is viewed as market-based.</li> </ul>
<ul style="list-style-type: none"> <li>• Monitoring &amp; Evaluation</li> </ul>	<ul style="list-style-type: none"> <li>• Describe how the project design has incorporated lessons from similar projects in the past.</li> <li>• Describe approach for project M&amp;E system, based on the project logical framework, including the following elements: <ul style="list-style-type: none"> <li>• Specification of indicators for objectives and outputs, including intermediate benchmarks, and means of measurement.</li> <li>• Outline organizational arrangement for implementing M&amp;E.</li> </ul> </li> <li>• Indicative total cost of M&amp;E (may be reflected in total project cost).</li> </ul>	<ul style="list-style-type: none"> <li>• Market-based approach with local participation are features drawn from past experience.</li> <li>• Paragraphs 67, 68 and 69</li> <li>▪ Annex B</li> <li>▪ Paragraphs 67 and 69</li> <li>▪ Paragraphs 66 and Annex A</li> </ul>

	<b>Work Program Inclusion</b>	<b>Reference/Note:</b>
<b>3. Financing</b>		
<ul style="list-style-type: none"> <li>Financing Plan</li> </ul>	<ul style="list-style-type: none"> <li>Estimate total project cost</li> <li>Estimate contribution by financing partners.</li> <li>Propose type of financing instrument</li> </ul>	<ul style="list-style-type: none"> <li>Cover page and paragraph 60</li> <li>Paragraphs 31, 33, 40 and 43</li> <li>Paragraphs 35, 36, 38, and 42</li> </ul>
<ul style="list-style-type: none"> <li>Implementing Agency Fees</li> </ul>	Proposed IA fee	<ul style="list-style-type: none"> <li>Standard Fee for Full Size Projects</li> </ul>
<ul style="list-style-type: none"> <li>Cost-effectiveness</li> </ul>	<ul style="list-style-type: none"> <li>Estimate cost effectiveness, if feasible.</li> <li>Describe alternate project approaches considered and discarded.</li> </ul>	<ul style="list-style-type: none"> <li>Annex A</li> </ul>
<b>4. Institutional Coordination &amp; Support</b>		
<p style="text-align: center;"><b>IA COORDINATION AND SUPPORT</b></p> <ul style="list-style-type: none"> <li>Core commitments &amp; Linkages</li> </ul>	<p>Describe how the proposed project is located within the IA's:</p> <ul style="list-style-type: none"> <li>Country/regional/global/sector programs.</li> <li>GEF activities with potential influence on the proposed project (design and implementation).</li> </ul>	<ul style="list-style-type: none"> <li>Paragraphs 17 and 18</li> </ul>
<ul style="list-style-type: none"> <li>Consultation, Coordination and Collaboration between IAs, and IAs and EAs, if appropriate.</li> </ul>	<ul style="list-style-type: none"> <li>Describe how the proposed project relates to activities of other IAs (and 4 RDBs) in the country/region.</li> <li>Describe planned/agreed coordination, collaboration between IAs in project implementation.</li> </ul>	<ul style="list-style-type: none"> <li>Paragraph 17 and 18</li> </ul>
<b>5. Response to Reviews</b>		
Council	Respond to Council Comments at pipeline entry.	
Convention Secretariat	Respond to comments from Convention Secretariats .	
GEF Secretariat	Respond to comments from GEFSEC on draft project brief.	
Other IAs and 4 RDBs	Respond to comments from other IAs, 4RDBss on draft project brief.	
STAP	Respond to comments by STAP at work program inclusion	
Review by expert from STAP Roster	Respond to review by expert from STAP roster. <sup>2</sup>	<ul style="list-style-type: none"> <li>Annex C (STAP review) and Annex D ( response to STAP review)</li> </ul>

<sup>2</sup> STAP Roster Review, and IA response, is a required annex of the project brief.



## PROJECT BRIEF

### 1. IDENTIFIERS:

**PROJECT NUMBER**

ECU/02/G3 1

**PROJECT NAME**

**Ecuador: Renewable Energy for Electricity Generation—Renewable Electrification of the Galapagos Islands**

**DURATION**

Three years

**IMPLEMENTING AGENCY**

United Nations Development Programme

**EXECUTING AGENCY**

DEA (Department for Alternative Energy, Ministry of Energy and Mines)

**REQUESTING COUNTRY**

Ecuador

**ELIGIBILITY**

Ecuador ratified the UNFCCC on February 23, 1993 (Entry into Force March 21, 1994)

**GEF FOCAL AREA**

Climate Change

**GEF PROGRAMMING FRAMEWORK**

OP #6: Adoption of Renewable Energy by Removing Barriers and Reducing Implementation Costs

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### 2. SUMMARY:

The project aims at reducing Ecuador's energy-related CO<sub>2</sub> emissions by introducing PV and wind energy as a substitute for fossil fuel (mainly diesel) utilised in electricity generation, specifically for the Galapagos Archipelago. In addition, the project will substantially decrease the volume of diesel annually shipped to the island, thereby reducing the environmental threat of an oil spill that can cause great damage to the biodiversity found in and around the coastal ecosystem of the islands. The activities proposed in the project are designed to remove barriers to the development and utilisation of renewable energy for electricity generation, initially in Galapagos but eventually in the nation as a whole. The project will develop local capacity to identify technical and financing options and to formulate the regulatory, institutional and financial instruments necessary to demonstrate the technical, economic, and financial viability of establishing joint ventures to generate electricity utilising renewable energy to supply mini-grids or feed into large grids.

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### 3. COSTS AND FINANCING (MILLION US\$):

<b>GEF</b>	Project:	3.80
	PDF B:	0.28
	<b>SUBTOTAL GEF</b>	<b>4.08</b>
<b>CO-FINANCING (Parallel)</b>	Government:	4.30
	Investors (including E7)	17.01
	<b>SUBTOTAL CO-FINANCING</b>	<b>21.31</b>
	<b>TOTAL PROJECT COST</b>	<b>25.39</b>

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### 4. OPERATIONAL FOCAL POINT ENDORSEMENT:

Name: Minister Lourdes Luque de Jaramillo

Date: September 26, 2001

Title: Minister of the Environment

**5. IA CONTACT:**

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

CENACE	Centro Nacional de Control de Energia
CONELEC	Comision Naonal de Electrificacion
CONAM	Cosejo Nacional de Modernizacion
EEPG	Empresa Electrica Provincial Galapagos S.A.
FERUM	Fondo de Electrificacion Rural y Urbano Marginal
FS	Fondo de Solidaridad
GEF	Global Environment Facility
INECEL	Instituto Nacional Ecuatoriente de Electrificacion
INGALA	Instituto Nacional Galapagos
IPP	Independent Power Producer
MEM	Ministerio de Energia y Minas
PPA	Power Purchase Agreement
UNDP	United Nations Development Programme

## 1. BACKGROUND AND CONTEXT

1. For people and markets located at large distances from the electrical grid, the absence of reliable and affordable renewable energy technologies for electricity generation has meant that the only possibility for the provision of electricity services is through small diesel generators. Despite many initiatives aimed at developing and utilizing renewable energy technologies, small diesel generators remain the primary supplier of small quantities of electricity to remote regions located far from the grid. In addition to the risks of fuel-spills associated with transporting the diesel fuel, continued reliance on diesel generation also results in the emission of greenhouse gases. Recent advances in the renewable energy field have meant that some of these remote areas can now be electrified through renewable energy on a least-cost basis.
2. The Galapagos Archipelago has four inhabited islands: Floreana (120 inhabitants), Isabela (1,500 inhabitants), San Cristóbal (5,500 inhabitants) and Santa Cruz (8,700 inhabitants). Small isolated diesel-based grids—often with inefficient electrical service, blackouts and poor maintenance—supply electricity to consumers. Diesel is transported from continental Ecuador in small tankers requiring frequent deliveries, in view of the small storage capacity on the islands. For example, on the basis of diesel shipments from January to August of 2001, it is expected that a total of some 2.1 million gallons would be transported to Galapagos during 2001. Out of this amount, approximately 1.4 million gallons, representing 66.7%, will be utilised for electricity generation.
3. There is the risk of fuel spills associated with the transportation of diesel fuel from the mainland. In the past, these have caused damage—at times substantial—to the highly sensitive ecosystem. In January 2001, the tanker *Jessica* ran aground in the archipelago and spilled 75,000 gallons of industrial fuel oil and 70,000 gallons of diesel, putting the island's coastal ecosystem at risk. Thanks both to the meteorological conditions prevailing at that time and to relatively quick action to control the spill, little damage to the fauna was done. However, this is the second such spill to occur within the past two decades. It is only a matter of time until more serious damages result.
4. UNESCO designated the Galapagos archipelago as a World Heritage site in 1978. This group of islands some 1000 km (600m) to the west of the Ecuadorian mainland arouses great interest within the international community for its vast wealth of diverse biological species. The archipelago's small economy depends mainly on tourism and, to a lesser extent, on fishing for its livelihood. Up until recently, the electricity tariff has been highly subsidised, as was the case in much of mainland Ecuador as well.
5. In the last decade, Ecuador has made several policy changes in the energy sector. In addition, the country experienced substantial economic slow-down over the same period, with, for example, the poverty incidence increasing from 34% in 1995 to 69% in 2000, while the number of people in extreme poverty doubled from 17% in 1997 to 34% in 1999. In March 2000, to restore confidence in economic management and stem the decline of economic activity and living standards, the Government decided on an array of structural reforms that included “dollarisation” of the economy complemented by an enhanced role for the private sector. Deregulation of the electricity market remains high on the Government's agenda, and the structural reforms adopted last year might provide it with a new boost.



6. In this connection, legal measures defining the framework for private capital participation in the electricity sector have been adopted. The first step was made in December 1993, when the Congress approved the Privatisation and State Reform Law (Ley de Modernización del Estado, Privatizaciones y Prestación de Servicios por Parte de la Inicativa Privada). This law establishes the legal basis to open the market for private sector participation in the provision of public services. Also, it makes provision for unbundling generation, transmission and distribution in the electricity sector and defines the procedures for transferring capital stocks to the private sector.
7. Another law that regulates the electricity sector is the Electric Sector Framework Law (Ley del Régimen del Sector Eléctrico) that was approved in October 1996. This law set up the National Electricity Council (Consejo Nacional de Electricidad, CONELEC). This regulatory body sets electricity tariffs and supervises their application and is responsible for rural electrification programmes. Subsidies for rural electrification are provided through the Fund for the Electrification of Rural and Marginal Urban Areas, (FERUM), from which electricity consumers in Galapagos directly benefit.
8. In addition, the Government approved in March 1998 the Special Framework Law for Conservation and Sustainable Development for the Province of Galapagos (Ley de Regimen Especial para la Conservacion y Desarrollo Sustentable de la Provincia de Galapagos) setting up the legal and administrative framework for policy and planning in Galapagos. This Law also strengthened the Instituto Nacional Galapagos (INGALA) in its capacity to serve as the focal agency for development and conservation within the province.
9. Within the context of the above Laws, the Government decided in late 1998 to convert the former Electric Utility Company in Galapagos—which was part of the then continental-based electricity company (INECEL)—into a private, public-owned company called Empresa Electrica Provincial Galapagos S.A. (EEPG). The shareholders of EEPG are: Fondo de Solidaridad, Consejo Provincial de Galapagos and the Municipalidades de San Cristobal, Santa Cruz and Isabela. The privatised EEPG inherited the poor operation and maintenance capability of its predecessor, which, together with its small size, makes it an unattractive target for private sector purchase. In order to reduce operating costs, EEPG is interested in introducing renewable energy for electricity generation and has made this one of the main objectives of its strategic management plan. It plans to achieve this through joint ventures with private companies interested in the reduction of greenhouse gases through the utilisation of renewable energy and, more importantly, in preserving the rich biodiversity wealth found in the Galapagos archipelago.
10. For its part, the Ministry of Energy and Mines (MEM) defined several strategic objectives for the energy sector, viz. to reduce the fossil fuel dependency for isolated grids and remote locations, to promote private participation in the energy sector, to introduce energy efficiency measures and to study the potential role of renewable energy, particularly in rural electrification initiatives.
11. In line with this, MEM—through the Department for Alternative Energy (DEA)—launched a small project to study the potential of renewable energy in the Archipelago in 1995. The project was implemented by DEA in collaboration with the research

community present on the islands and obtained some support from UNDP, UNIDO and UNESCO. The objectives were to undertake renewable energy data collection, determine potential sites for renewable energy utilisation, select technologies that were appropriate for introduction in Galapagos and determine institutions that could be responsible for implementation of activities. This study was completed in 1996 and recommended a thorough investigation of the barriers to renewable energy utilisation in Galapagos.

12. Following the above initiative, GEF approved a PDF B in 1997 to identify the barriers to the electrification of the Galapagos Archipelago through renewable energy. This activity was earmarked for implementation with the participation of local institutions like EEPG, INGALA and the Charles Darwin Research Station. It was also expected that the results of the PDF B would provide useful data that would assist the Government in identifying the potential barriers to the development and utilisation of renewable energy for electricity generation, both off-grid and grid-connected, in continental Ecuador. This preparatory phase was conducted with a view towards presenting a full-sized project for GEF funding.
13. In addition to the GEF PDF B for Renewable Electrification of the Galapagos, following the grounding of the tanker *Jessica* in January of this year, GEF approved an MSP for Ecuador entitled “Galapagos Oil Spill - Environmental Rehabilitation and Conservation” (ECU/01/G35 - US\$ 530,000 from GEF, US\$ 521,000 from the Private Sector, US\$ 200,000 from USAID, US\$ 66,000 from UNDP, US\$ 36,000 from the Government of Holland, US\$ 20,000 from the Government of the People's Republic of China and US\$ 2,000 from the State of Israel). The MSP provided support for both immediate needs in the wake of the oil-spill and long-term needs in order to plan how to avoid such accidents in future. This project proposal is one part of the outcome of that long-term action plan. By shifting the islands’ electricity system to a largely renewable basis, it will reduce the risk of future oil spills and their potential negative impact on the significant coastal biodiversity endemic to the region.
14. Through implementation of the PDF B, the following were identified as major barriers to the utilisation of renewable energy for electricity generation in Galapagos:
  - Limited experience with renewable energy technologies, especially with regard to electricity generation;
  - Lack of familiarity with the operation and maintenance of renewable energy and hybrid renewable electricity systems;
  - High initial capital cost of renewable energy technologies;
  - No experience with power purchase agreements and independent power generation;
  - Lack of experience with project finance investments and joint venture operations between electric utilities and the private sector; and
  - Difficult access to finance for renewable energy technologies that are new to Ecuador due to high perceived risks;

15. To overcome these barriers, the present full project will establish commercial demonstrations of state-of-the-art PV/Wind/Diesel hybrid systems, as appropriate, on each of the four inhabited islands. As part of the PDF B, pre-feasibility studies to implement such hybrid systems were carried out. This full project will seek to implement as large a share of the renewable electrification as is considered feasible.
16. For the full project, the GEF will contribute towards the incremental costs in order both to encourage the adoption of these technologies and to establish a replicable framework for future projects in the electricity sector. Thus, the proposed demonstration investment project is designed not only to demonstrate the sustainable use of renewable energy in an ecologically fragile remote area—the Galapagos—but also to provide a framework that can be pursued to further promote renewable electricity generation in continental Ecuador.

*Prior Ongoing Assistance*

17. In addition to the GEF-supported PDF-B and MSP projects that led to the preparation of this brief, there are two other GEF-supported initiatives that are directly relevant to this project. The first is the project entitled “Integrated Programme for the Control of Introduced Species in Galapagos Archipelago (ECU/00/G31-US\$ 18,300,000 from GEF and US\$ 15,040,000 co-financing). UNDP is implementing this project. This full-scale project will establish an integrated programme for the control of introduced species as a comprehensive operational framework for investment and technical assistance aimed at preventing new introductions to the archipelago; controlling specific alien species; and eradicating key alien species that are particularly damaging to endemic biodiversity. UNDP and the Charles Darwin Foundation are collaborating to ensure that this project and the one described in this proposal are consistent with each other. For example, out of concern for the invasive species problem, the renewable energy project has decided that it will not consider the possibility of generating electric power from biomass, so as not to encourage a long-term sustainable use for the biomass from exotic tree species.
18. The second related project is entitled “Power and Communications Sector Modernizations and Rural Services Project –(PROMECS -P063644, US\$ 2,840,000 from GEF and US\$ 40,410,000 from co-financing, including loans). The GEF Implementing Agency for this project is the World Bank. The project will support the Government’s efforts to deepen reforms in the telecommunications and electricity sectors, by strengthening regulatory institutions, improving environmental management of the sector’s activities, fostering competition, increasing private participation, promoting efficient use of energy, extending coverage in under-served rural areas and providing modern information technology (ICT) and supported services to micro and small businesses (MSB). This Bank project focuses on power sector reform and electrification on the mainland. It has no specific focus on the Galapagos. To date, careful coordination has been maintained with this World Bank project and the framework proposed for the Galapagos renewable re-powering is entirely consistent with the Government’s power sector reform framework

## 2. RATIONALE AND OBJECTIVES

### *Rationale*

19. In 2000, approximately 1.9 million U.S. gallons of diesel were transported to Galapagos from continental Ecuador for use mainly for electricity generation, ferries and land vehicles, by the Armed Forces and for industrial purposes. The volume shipped to the Archipelago will increase to approx. 2.1 U.S. gallons in 2001, of which some 66.6% will be used to power diesel generators for electricity generation on the four inhabited islands of Floreana, Isabela, San Cristobal and Santa Cruz.
20. Galapagos enjoys a very good solar regime (average of 5.5 kWh/m<sup>2</sup>/day). The wind regime is quite good on San Cristobal (6.8 m/s) and ranges from potentially good on Floreana and Santa Cruz to marginal on Isabela. Introducing renewable energy technologies (PV and wind), either individually or in a hybrid mode, would make it possible for over 70% of the electricity needs of Galapagos to be met from locally available solar and wind resources. This will have the effect of substantially reducing the amount of diesel used annually for this purpose (from 1.4 million gallons to 0.4 million gallons in 2001 figures), leading to significant global benefits by reducing greenhouse gas emissions. It is expected that the introduction of renewable energy for electricity generation in Galapagos will generate a reduction of 240,000 tons of CO<sub>2</sub> over a 20-year lifetime of the equipment.
21. The introduction of renewable energy technologies for electricity generation will decrease the amount of diesel to be transported to Galapagos by 1.0 million gallons, in terms of projected figures for 2001. This will represent a reduction of 50 % in the amount of diesel shipped to the islands. This transportation often takes place in small tankers that are prone to oil leaks and are more vulnerable to running aground in heavy seas, thus causing oil spills (e.g. Jessica, January 2001) and damaging the unique species and delicate ecosystem found in and around the islands. Consequently, renewable energy-based electrification of Galapagos will have the net effect of decreasing the volume and frequency of oil shipment to the Archipelago, thus, substantially reducing the probability of oil spills.
22. While national coverage of electricity is relatively high (80% of the total population), 45% of the rural population living in dispersed communities far from the grid have no access to electricity services. Many of these rural communities may not be connected to the grid for the next 15-20 years because of the high investment that is required for grid expansion. Thus, removal of the identified barriers to renewable energy-based electricity generation in Galapagos will provide the private sector with the necessary confidence to set up mini-grids based on renewable energy technologies to supply these rural consumers in continental Ecuador with electricity services. The net result will have a three-fold effect: provide rural consumers with a better quality of life, create opportunities for income-generating activities based on the availability of electricity services, thus assisting in poverty eradication, and generate the potential to substantially reduce the electricity sector carbon emissions. In addition, it will create opportunities for grid-connected electricity generation through renewable energy.
23. In addition to bringing about local, national and global benefits, the project is consistent with Ecuador's national development priorities. It will increase the use of renewable

energy and decrease diesel consumption, with the result that Ecuador will have an increased volume of diesel for export, earning valuable revenue for providing improved social services to its citizens. The Government of Ecuador is currently engaged in a process of privatising the electricity sector and, hence, the project is in line with the objectives of MEM's development and privatisation programme.

24. For all the four inhabited islands, the pre-feasibility study undertaken by Lahmeyer began with an assessment of demand for electricity on the islands. The breakdown of demand by sector on the islands for the year 2000 and the forecast for the year 2020 is summarized in Table I below. On all the four islands, the bulk of the energy is utilised in the residential, commercial and government sectors, mainly for lighting, refrigeration and air-conditioning, with a pronounced evening peak. This creates a good opportunity for energy efficiency measures on the demand side to be implemented in conjunction with repowering. Although tourism is an important part of the economy, increasingly, it relies on touring ships, so that much of the tourist-based energy consumption is met through the generation found on these ships.

**Table I: Breakdown of Electricity Consumption by Sector**

Island	Year	Total Number of Consumers	Total Consumption (MWh)	Residential Sector (MWh)	Commercial Sector (MWh)	Industrial Sector (MWh)	Gov't Sector (MWh)	Others (MWh)
Santa Cruz	2000	2,175	6986	3391	2194	64	624	713
	2020	2,403	10513	5305	3432	70	761	945
S. Cristobal	2000	1,400	4534	1713	916	64	1185	656
	2020	1,708	8125	3782	2021	78	1445	799
Isabela	2000	455	760	525	122	6	70	37
	2020	484	1181	840	195	7	85	54
Floreana	2000	32	38	12	13	0	5	8
	2020	44	65	28	19	0	6	12

Others: This category includes water pumping and street lighting.

25. The prefeasibility assessment then considered 3 different renewable energy penetration scenarios: High (96-100%), Medium (80-86%) and Low (60-66%). Additional work undertaken with the support of the MSP has identified the "best option" renewable energy penetration scenario for each of the islands. It is this best-case scenario that is assumed throughout this activity. In all cases, it is assumed that the existing diesel generators will remain in place and operate in a hybrid mode to meet any short-fall in electricity generation that may be the result of transient unfavourable solar/wind conditions. The scenarios to be pursued are as follows:

- Floreana: Medium penetration factor of 80% achieved with 8.55 kWp of PV and 12 kW of Wind;

- Isabela: Low penetration factor of 60.8% achieved with 440 kWp of PV;
- San Cristobal: High penetration factor of 97.5% achieved with 2.2 kWp of PV and 1.75 MW of wind; and
- Santa Cruz: Low penetration factor of 61.4% achieved with 2.2 kWp of PV and 6.25 MW of wind.

26. The total investment cost of the repowering plants for all the four islands, as per the scenarios outlined in para. 24 above and inclusive of incremental cost, is estimated at \$ 24.56 million. The cost break-down for each island is as follows:

- Floreana: \$ 0.76 million;
- Isabela: \$ 6.80 million;
- San Cristobal: \$ 6.2 million; and
- Santa Cruz: \$ 10.8 million.

Table II summarizes the information provided in para. 24 and 25 above:

**Table II: Scenario Summary**

<b>Island</b>	<b>Scenario (% Renewable)</b>	<b>Technology</b>	<b>Installed Capacity</b>	<b>Total cost</b>
<b>Floreana</b>	80%	PV Wind	8.55 kWp 12 kW	\$ 0.76 m
<b>Isabela</b>	60.8%	PV	440 kWp	\$ 6.80 m
<b>San Cristobal</b>	97.5%	PV Wind	2.2 kWp 1.75 MW	\$ 6.20 m
<b>Santa Cruz</b>	61.4%	PV Wind	2.2 kWp 6.25 MW	\$10.80 m

***Objectives, Outputs and Activities***

27. The global objective of the proposed project is “to reduce Ecuador’s energy-related CO2 emissions by substituting PV and wind energy for fossil fuel (mainly diesel) utilised in electricity generation.” In addition, specifically for Galapagos, the project will substantially decrease the volume of diesel annually shipped to the island, thereby reducing the environmental threat from an oil-spill that can cause great damage to the rich mix of species found in and around the islands. This will be achieved by project activities designed to remove barriers to the development and utilisation of renewable energy for electricity generation, initially in the Galapagos, and nation-wide at a later stage. The project will develop the regulatory, institutional and financial instruments necessary to demonstrate the technical, economic, and financial viability of establishing joint ventures to generate electricity utilising renewable energy to supply mini-grids or feed into large grids. It will remove the barriers to the large-scale replication of this technology in continental Ecuador, thereby enhancing the dissemination of such a model in the Andean Region and elsewhere.

28. The development objective of the project is “to promote the utilisation of renewable energy (PV and Wind) for electricity generation, thus reducing Galapagos’ dependency

*on diesel shipped from continental Ecuador.”* This will enable Galapagos to benefit from a clean, modern and, at the same time, reliable source of energy for electricity generation. A secondary objective is the decreasing of oil spills that pose a threat to the ecosystem in and around the islands. The project also aims at supporting the Government’s objective of introducing renewable energy technologies based on PV, wind and other renewables for electricity generation to supply remote mini-grids and the national grid making available more oil for export. In addition, the project will assist Ecuador in decreasing power-related operation and maintenance costs.

29. The project consists of the following four components:

- Component 1: Technical Assistance for finalising the full feasibility study, delineating the project structure; and strengthening EEPG;
- Component 2: Implementation of the IPP PV/wind/diesel hybrid electricity generating systems on Floreana and San Cristobal (Phase I);
- Component 3: Implementation of the IPP PV/wind/diesel, as appropriate, hybrid electricity generating systems on Isabela and Santa Cruz (Phase II).
- Component 4: Dissemination of experiences and lessons learned and replication on the mainland and throughout the region.

30. Each of the four components is composed of an immediate objective, specific outputs and a number of activities. By achieving the four immediate objectives, the project will contribute towards the achievement of the global and development objectives.

31. Component 1: The immediate objective is *“to support the national partners to complete the full feasibility and design of the systems for re-powering electricity generation on each of the islands.”* The Government has indicated that although it gives the highest priority to initiating work on San Cristobal, the re-powering exercise should be considered as a package for all the 4 inhabited islands. However, considering the limited technical capability and availability of skilled human resources on the islands, a phased approach appears to be the most logical one to implement the re-powering activities. This component will lay the foundation for the joint ventures to be established with private investors. The cost of this component is estimated at \$ 250,000.

32. The outputs will be:

**Output 1:** Full feasibility and design completed, including more accurate cost estimates and an implementation schedule for repowering electricity generation on each of the 4 islands.

**Activities:**

- On the basis of the renewable energy penetration scenario for each island, to complete the full technical feasibility and prepare the design, including the selection of individual technical components for each system.
- To complete the economic and financial feasibility of the technical design proposed for each system and prepare cost estimates for each island.
- To formulate an implementation plan and schedule for repowering each island.

**Output 2:** Legal and operational agreements for the establishment of joint ventures to build, own and operate the generation plants established.

**Activities:**

- To review the present by-laws applicable to the electricity sector to clarify the issue regarding private power generation in the country.
- To draft, in consultation with CONELEC, the necessary amendments to the Electricity Sector by-laws allowing Independent Power Producers (IPP) to operate in the country.
- To assist CONELEC in preparing the required documentation for submission to its Board for approval.

**Output 3:** Power purchase agreements between each joint venture and EEPG prepared.

**Activities:**

- To review Power Purchase Agreements already being utilized in selected countries in the region to determine suitability and applicability in the Ecuador context.
- To prepare, in consultation with CONELEC and EEPG, Power Purchase Agreements (PPA) that will regulate the sale of electricity by joint ventures to the EEPG grid on each island.
- To assist EEPG in negotiating the PPAs with the respective investor.

33. Component 2: The immediate objective of this component is *“To facilitate repowering on Floreana and San Cristobal with PV/wind/diesel hybrid electricity generating systems through strengthening the institutional capacity of the national partners.”* The actual construction and commissioning of the renewable energy generation plants for Floreana and San Cristobal will be undertaken by the individual joint venture companies. This component will be based on the full feasibility and design study, as outlined in para. 3.1 above. The cost to the GEF of this component is estimated at US\$350,000. Most of this work will be financed by contributions of the E7 group and of Spanish AECI and the European Commission.

34. The outputs will be:

**Output 1:** CONELEC and EEPG’ s capacity related to design and to negotiate Independent Power Producer (IPP) schemes and Power Purchase Agreements (PPAs) strengthened.

**Activities:**

- To identify and recruit Consultant, preferably from the region, to provide training to the stakeholders on the design of IPP schemes and PPA agreements.
- To organize training workshop in Ecuador for stakeholders to gain insights into the intricacies of IPP schemes and PPA agreements. Utilities from the mainland will be invited to participate.

**Output 2:** EEPG’s capacity to design and negotiate contractual arrangements for operation and maintenance strengthened.

**Activities:**

- To identify and recruit Consultant, preferably from the region, to provide training to the EEPG in the negotiation of operation and maintenance contracts that it may require for maintaining its distribution network.



- To organize training workshop in Galapagos for EEPG management and technical staff in the negotiation of operation and maintenance contracts. Utilities from the mainland will be invited to participate.
35. For Floreana, Trama TecnoAmbiental (Ecuador), with financial support from the Spanish Agency for International Economic Cooperation (AECI) and the European Union, will establish a joint venture with the Parque National Galapagos and the Junta Parroquial de Floreana to build and operate the generating plant.
  36. In the case of San Cristobal, the E7 will establish a joint venture with an Ecuadorean company, possibly with a subsidiary of EEPG. The participation of E7 in this project is facilitated through a Memorandum of Understanding between UNDP and E7 for collaboration on issues of climate change and sustainable development in UNDP programme countries.
  37. The E7 members are nine of the world's leading utilities from the G7 countries. They are: American Electric Power (AEP-USA); Electricite de France (EDF-France); ENEL (Italy); Hydro Quebec (Canada); Kansai Electric (Japan); Ontario Power Group (Canada); RWE (Germany); Scottish Power (UK); and Tokyo Electric Power (TEPCO-Japan). Created in the wake of the 1992 Rio Summit, the E7 "promotes global environmental protection while considering the economic growth of developing countries". The E7 priorities include, among others, climate change and sustainable development.
  38. The respective joint venture will establish a power purchase agreement (PPA) with EEPG to sell electricity to the grid as an independent power producer (IPP).
  39. For Phase I, the contract for procurement of the equipment for the construction of the generating plant on Floreana will be awarded on the basis of competitive bidding, but will be restricted to suppliers based in Europe. This practice follows requirements set by the European Union that will provide the bulk of the funding. With regard to San Cristobal, procurement of equipment will follow rules and procedures of the participating E7 Utilities. UNDP will provide coordination between the islands, EEPG, the Government and the international partners.
  40. Component 3 (Phase II): The immediate objective is "*To facilitate repowering on Isabela and Santa Cruz with PV/wind/diesel hybrid electricity generating systems.*" The GEF is requested to contribute US \$3 million towards the incremental costs of the re-powering programme. Because of the strong support to the re-powering of Floreana and San Cristobal expressed by other participants, the GEF funds are being largely devoted to Phase II and the islands of Santa Cruz and Isabela.
  41. The outputs from Phase II are expected to be:
 

**Output 1:** PV-wind-diesel hybrid system repowered and in operation for Santa Cruz

**Activities:**

    - To identify potential investor and mobilize additional financial resources to re-power generation system on Santa Cruz.
    - To assist CONELEC and EEPG in finalizing IPP and PPA with investor.
    - To participate in repowering exercise through the provision of financial resources to cover the incremental cost component.

**Output 2:** PV-diesel hybrid system repowered and in operation for Isabela.

**Activities:**

- To identify potential investor and mobilize additional financial resources to re-power generation system on Isabela.
- To assist CONELEC and EEPG in finalizing IPP and PPA with investor.
- To participate in repowering exercise through the provision of financial resources to cover the incremental cost component.

The arrangements for the re-powering of Isabela and Santa Cruz (Phase II) will be finalised while Phase I is under implementation. UNDP will work closely with EEPG and the Government to identify potential sources of financing and co-financing to ensure that the entire program is adopted. On a preliminary basis, KfW and the UN Foundation have both expressed an interest in supporting this component, although the details of the support have not been finalized. Other donors will be approached on an “as-needed” basis.

42. For Phase II, the financial package will comprise, among others, Fondo de Solidaridad (FS), through a subsidiary company, in the joint venture. FS manages FERUM funds on behalf of CONELEC. As the funds provided by FERUM to EEPG are available only on a monthly basis, the strategy is to use a pledge by FERUM to support the project to obtain financing from other sources. Thus, it is expected that the funds necessary for the completion of Phase II will involve funds from the GEF, international sources, and local Government regulatory bodies.

43. Component 4: The immediate objective is “*Disseminate experiences from the repowering of Floreana and San Cristobal to Phase II and support replication efforts on the mainland and throughout the region*”. The cost of this component to the GEF is estimated at US\$ 250,000. Repowering on Isabela and Santa Cruz could benefit from early lessons learned on the other two islands. The knowledge and experiences accumulated in repowering the Galapagos archipelago will be made available for similar efforts on the mainland.

44. The outputs will be:

**Output 1:** Initiation of a national programme in Ecuador to replicate the use of solar and wind and other renewable energy resources such as micro/mini-hydro and biomass to generate electricity to supply isolated mini-grids and the national grid supported.

**Activities:**

- Prepare model IPP schemes and PPA agreements for use both nationally and outside Ecuador
- Prepare publication on the lessons learned and results of the repowering exercise in Galapagos for distribution both within and outside Ecuador.
- Publicise the results achieved in Galapagos through presentations at national and international seminars/workshops.
- Organise site visits to the islands for other investors and electricity utilities interested in implementing similar concepts nationally or internationally.

45. The GEF Budget for the entire program is supplied in Table II below. The detailed incremental cost analysis is provided in Annex A and discussed in Section 6.

#### **4. RISKS AND SUSTAINABILITY**

45. The project presents several levels of risk. The first is related to the regulatory framework within which EEPG operates, and this is already being clarified. The next level relates to the successful implementation of the joint ventures on all four islands. This will be mitigated through the contracts and agreements governing the project. The third level of risk deals with migration from continental Ecuador. This is mitigated by the fact that INGALA exercises tight control over migration to the islands. Finally, the fourth level of risk deals with the replication of the Galapagos experience to other parts of continental Ecuador, aimed at supplying renewable energy-based electricity to both the main grid as well as to isolated mini-grids. The project cycle for the Galapagos will provide “lessons learned” that will largely contribute towards mitigating this level of risk.
46. With respect to the first risk, the Privatisation and State Reform Law clearly sets the framework for unbundling of the electricity sector and promoting private capital investment. However, while the by-laws are clear about private generation for grid-connected systems, they are not clear on private generation for decentralised systems, and that includes Galapagos. The by-laws also indicate that, while the whole electricity sector in Ecuador will be unbundled, this will not be the case for EEPG as it will continue having responsibility for generation, transmission and distribution. However, they do not indicate whether EEPG has exclusive right for electricity generation and, if it has, whether it can exercise the option of sharing this right with others interested in the sector. The above issues have already been brought to the attention of CONELEC by EEPG and clarification of the pertinent by-laws is expected soon. Developments will be closely monitored and appropriate action taken to ensure that the project’s actions are fully consistent with these evolving guidelines.
47. The second risk is that associated with the implementation of the joint venture on all four islands. This risk is considered small to moderate. The project has been developed in close consultation with various key Government Ministries and is supported at the highest political level. Laws are in place to facilitate private sector participation in the provision of public services, including electricity services. The electricity tariff structure has been revised to take account of long-run marginal costs. In addition, the Government has adopted a policy to reduce fossil fuel dependency for electricity generation and use renewable energy as a substitute, where feasible. Moreover, development costs related to the contractual agreements in respect of the joint ventures will be financed under the present project. This situation will be closely followed during project finalization and implementation.
48. However, there is a secondary risk associated with this one and it concerns the fact that private investors, especially those from outside Ecuador, may not feel comfortable investing in the country in view of the state of the economy. While plausible, the general consensus among investors is that the economy in Ecuador has “bottomed out” since the Government decided to “dollarize” it last year, despite considerable opposition

from certain quarters, and all signs point towards a slow but sure economic recovery. This has generated confidence in the minds of external investors, thereby minimizing this risk. However, this situation will also be closely followed and monitored.

49. An additional secondary risk associated with the problem of ensuring joint ventures for all four islands relates to the question of adequacy of investment resources. What happens if UNDP's efforts cannot raise sufficient investment resources to ensure that all four islands are re-powered with renewable energy systems. Preliminary indications are that there will be no such difficulties, but nevertheless, the goal is to take the process of repowering the Galapagos with renewable energy as far as possible. The priority given to the islands has been discussed with the Government, and this will dictate which islands take precedent. The process of raising the capital is expected to be fairly straightforward and should be completed within the first year of project life.
50. The third risk factor is associated with the population and therefore the demand for electric services on the islands. It is quite possible that provision of reliable and efficient energy services from renewable energy sources and the ensuing income-generating opportunities that they may provide, could give rise to a "migration rush" to the islands from continental Ecuador. However, the Law of the Galapagos has established a commitment to manage with care the ecology of the islands. This risk is mitigated by the fact that INGALA (created under the Law of the Galapagos), as a "super-Ministry" for Galapagos, exercises tight control over migration to the islands. The insular nature of the Archipelago and the relatively small population of the islands do facilitate this task. Nevertheless, population growth, and its impact on electricity demand within the islands, will be an important factor to be monitored.
51. The last risk factor identified is related to the replication of the Galapagos experience to other parts of continental Ecuador. This risk is also considered quite small. After the successful demonstration of the joint venture approach in Galapagos to sell renewable energy-based electricity to the grid using the PPA concept, it is expected the investors, both local and foreign, will find the modality interesting and worth replicating. Already, there is some interest to explore the possibility of a grid-connected wind farm in the northern province of Imbabura on continental Ecuador. Hence, a positive experience in Galapagos will go a long way towards generating investor confidence in IPP/PPA arrangements in the electricity sector in Ecuador.

## 5. STAKEHOLDER PARTICIPATION AND IMPLEMENTATION ARRANGEMENTS

52. The relevant Government institutions in Ecuador dealing with energy and climate change issues and with international collaboration were consulted during the implementation of the PDF B. They all unanimously support this follow-up proposal. They are the following:
  - **Ministry of Environment (MoE)** -- National Focal Point for GEF matters and main authority for environmental policy, strategy, regulations, inspection, management and education.
  - **Ministry of Energy and Mines (MEM)** -- Responsible for policy formulation and defining strategic objectives in the Energy (and Mining) Sector. MEM's **Department**

**for Alternative Energy (DEA)** in charge of national renewable energy (and energy efficiency) research programmes.

- **National Modernisation Council (CONAM)** -- Responsible for the overall design and oversight of reform and modernisation of, among others, the electric power sector, including privatisation of this sector.
- **National Electricity Council (CONELEC)** -- Electricity regulator entrusted with the responsibility to set electricity tariffs and supervise their application; has also responsibility for rural electrification programmes and administration of subsidies for rural electrification through the Fund for the Electrification of Rural and Urban Marginal Areas, (FERUM). The Electricity Law grants CONELEC specific attributions to supervise environmental management in the sector, in coordination with the Ministry of Environment.
- **Galapagos Institute (INGALA)** -- Archipelago institution created under the Special Framework Law for the Conservation and Sustainable Development of Galapagos. It is the focal agency for development and conservation in Galapagos. As such, it deals with an array of issues, including environmental impacts of infrastructure projects, local community participation on major decisions related to the islands' development, etc.
- **National Energy Control Centre (CENACE)** – Exercises control and supervision over the correct operation of the electrical system in terms of standards for voltage, frequency, installation, etc. and administers the electricity wholesale market in continental Ecuador.
- **Empresa Electrica Provincial Galapagos S.A.** -- Electrical utility in the Archipelago. Owns, operates and maintains the electrical system. It is a private, government-owned company.
- **Charles Darwin Research Station** -- Research centre for local scientists and international scientific community. Offers a programme on environmental education for scholars and disseminates scientific information on environmental issues.

53. The discussions that were held with the above stakeholders during the PDF phase brought to light two important considerations. The first is that there is considerable opposition to continued studies of the energy system. The local population are supportive of the renewable re-powering of the islands and would like the work to begin as soon as possible. Hence, several studies that were proposed have been curtailed. Second, the Charles Darwin Foundation, among others, expressed concerns that a proposal to use the biomass from invasive tree species might create a sustainable use for these otherwise undesirable invasive species. As a result of this opposition, all consideration of the biomass option has been dropped from the current proposal.

54. Joint venture companies will implement renewable energy schemes to re-power electricity generation on each of the four inhabited islands and sell electricity to EEPG under a power purchase agreement. These companies will work in close collaboration with INGALA to ensure that local communities fully participate in the decision-making process.

55. Public participation is vital in the whole electricity repowering process. It is important that the Galapagos residents as well as the whole of Ecuador be briefed on the complete exercise and their support secured. In Galapagos, the Project Manager (see next para.) will need to maintain very close contact with INGALA and the local communities on

each of the islands. The Project Manager will organise “town meetings” with the local inhabitants to secure their concurrence and support to the activities proposed for implementation and to explain to them the benefits that the islands would derive from such activities.

56. The UNDP GEF project will be implemented by the Department for Alternative Energy (DEA) of the Ministry of Energy and Mines, under the national execution (NEX) modality. For this purpose, MEM will set up a Project Management Unit (PMU) consisting of a national Project Manager and a Project Assistant. The Project Manager will be responsible for day-to-day operations and will act as a liaison/facilitator among the various local stakeholders, both in Galapagos and continental Ecuador, and donors/investors.
57. In addition, a Project Steering Committee, consisting of representatives of CONAM, EEPG, CONELEC and CENACE, co-chaired by INGALA and UNDP, will provide overall guidance to project execution. The Ministry of Environment will supervise and monitor the project as the GEF national focal point. The private sector investors participating in the joint ventures may be invited to participate in the meetings of the Steering Committee on an ad-hoc basis.

## **6. INCREMENTAL COSTS AND PROJECT FINANCING**

58. This project is designed to remove barriers to the renewable electrification of the Galapagos Archipelago. In so doing, it will achieve the stated objectives of GEF Operational Program 6 as well as meeting secondary objectives of reducing the risks to biodiversity from potential future oil spills. As it is unlikely that these project activities would take place in the absence of UNDP and GEF support, the project can largely be considered to be incremental.
59. A detailed assessment of incremental costs is discussed in Annex A. According to the matrix contained in Annex A, the baseline costs of continuing to generate power for the Galapagos Archipelago using diesel fuel comes to approximately US\$17,010,000. (Note that this measure contains no attempt to estimate the potential costs of future environmental damage to the biological resources of the archipelago of future oil spills. In such a case, the baseline costs would be much higher.) Based upon the information provided during the PDF B, the costs of re-powering the Galapagos using the scenarios specified are approximately US\$25,410,000 (Table II below). This makes the incremental costs equal to approximately US\$ 8 million. Given the high importance accorded to the Galapagos by the world community and the strong interest expressed in supporting the project, the GEF is only being asked to supply one half of this total, or US\$ 4.1 million (including the PDF B).
60. In terms of global benefits, the re-powering of all four electricity systems at the level targeted in this proposal will result in a net GHG emission reduction of 12,000 tons of CO<sub>2</sub> per year, or nearly 240,000 tonnes over the twenty-year lifetime of the project. To the extent that the success of the Galapagos project can be replicated to other unelectrified or remote areas of Ecuador, this figure will become much larger.

61. In terms of the quality of electricity service provided to the electricity consumers of the Galapagos, the quality should be similar, if not improved, following the re-powering effort. Part of the re-powering will involve undertaking a demand-side management review to ensure that an optimum amount of electricity is required. This will also help hold demand growth in check. In addition, any future tariff increase will also have a similar effect. These tariff increases are already underway as part of the power-sector reform process.
62. In addition to the above, there is an additional global environmental benefit of reducing the risks to local biodiversity from future oil spills. By reducing the diesel requirements of the archipelago by nearly 1 million gallons per year, both the probability and intensity of future oil risks is reduced.
63. In terms of the local environment, using renewable energy in place of diesel generation will reduce emissions that might be of local concern if population and demand growth were to continue unabated. With reference to the local environmental implications of the renewable re-powering, all local environmental regulations will be observed. In addition, all batteries used for energy storage will be transported to the mainland for recycling. The aesthetics of wind turbines have been considered in siting and wind-speed measurement to identify sites with minimal visual impact. In addition, known bird flight paths have been avoided in choosing potential wind turbine sites.
64. As mentioned previously, this project proposes a program to re-power all 4 inhabited Galapagos Islands using renewable energy. UNDP is working with the Government to pursue this goal both for global environmental and national reasons. The first phase proposed here—the re-powering of Floreana and San Cristobal—will be undertaken using funds from other sources. For the second phase—focusing on Isabela and Santa Cruz—additional funds will have to be raised. The GEF contribution will form a foundation for raising the total of nearly \$17m that will have to be raised. . Discussions have already taken place to enable FERUM to devote its annual support to the Galapagos Electricity system to the re-powering process. Preliminary discussions have been initiated with other donors and financiers, including KfW and the UN Foundation, to determine their commitments and the precise mechanisms for their contributions.

65. The overall financing of the project is summarized in Table III below.

**Table III: Project Financing, US\$**

<b>Project Activity/ Component</b>	<b>GEF</b>	<b>Government</b>	<b>Others</b>	<b>Total</b>
<b>Activity 1. Technical assistance to establish foundation for joint ventures</b>	200,000	50,000 (in kind )		
<b>PDF B:</b>	283,100			
<b>Total:</b>	483,100	50,000 (in kind)		<b>533,100</b>
<b>Activity 2. Construction of Generating Plants on Floreana and San Cristobal</b>	350,000	250,000(in kind)	6,300,000	
<b>Total</b>	350,000	250,000(in kind)	6,300,000	<b>6,900,000</b>
<b>Activity 3. Construction of Generating Plants on Isabela and Santa Cruz</b>	3,000,000	3,950,000(FER UM)	10,710,000	
<b>Total</b>	3,000,000	3,950,000(FER UM)	10,710,000	<b>17,660,000</b>
<b>Activity 4. Monitoring , Evaluation and Dissemination</b>				
<b>Total</b>	250,000	50,000 (in kind)		<b>300,000</b>
<b>GRAND TOTAL</b>	<b>4,083,100</b>	<b>4,300,000</b>	<b>17,010,000</b>	<b>25,393,100</b>

## **7. MONITORING, EVALUATION AND DISSEMINATION**

66. The project will be monitored and evaluated according to standard UNDP rules for nationally executed projects. For each of the three components, a monitoring plan will be made during project finalization. As part of this process of project finalization, a detailed set of indicators will be developed, including measures to track the major external project risks. These indicators will draw upon all sources of information, including those gathered during a World Bank project to monitor livelihoods and standards of living on the islands. Appropriate and specific performance benchmarks will be established prior to project implementation to effectively monitor project progress and to make crucial management decisions. A quarterly review and reporting cycle will be established for this project that will provide progress reports to be shared by all participants in the project.
67. In addition, EEPG's record-keeping will also be strengthened to enable adequate attention to information about electricity generation and sales, as well as renewable energy generation. Information about the fraction or quantity of energy provided by renewable sources vs. fossil fuel will be an important measure of project success. This will become especially important for information sharing from the archipelago to the mainland.
68. As the project progresses from the first phase of re-powering Floreana and San Cristobal, the lessons learned and experiences gained in the process will be carefully documented for sharing across mainland Ecuador. This will be used by MEM in their planning for and promotion of renewable energy development in Ecuador at large.



**8. ANNEXES**

Annex A - Incremental Costs

Annex B – Project Planning Matrix

Annex C - STAP Review

Annex D- Response to STAP Review

Annex E - Endorsement Letter (attached PDF file)

## **ANNEX A – INCREMENTAL COST ANALYSIS**

### **BROAD DEVELOPMENT GOALS**

The development goal being pursued by the Government of Ecuador is the provision of electricity services to its entire population. After power sector restructuring, this service will be largely provided by the private sector on a least-cost basis. For the Galapagos, and many other areas of Ecuador, this electricity is generated by diesel fuel which results in both emissions of GHG's and poses an environmental hazard to the surrounding ecosystem through increased risk of oil-spills.

### **BASELINE**

The baseline scenario assumes that re-powering Floreana, Isabela, San Cristobal and Santa Cruz islands will be carried out directly by EEPG using the current diesel technology. This private company has inherited poor management from the past and will be internally short of human capacity and financial resources to simultaneously improve operation and maintenance on the islands. Therefore, re-powering will be based entirely on the re-installation of diesel engines, a technology known to EEPG with a relatively low investment cost.

The energy market in Ecuador is relatively inefficient. Until recently, it has evolved around heavy subsidies with no attempt or encouragement to incorporate externalities associated with electricity production. Other factors contributing to the inertia in the current system are difficulties in technology adaptation, financial barriers, insufficient technical capacity and institutional weakness.

### **GLOBAL ENVIRONMENTAL OBJECTIVE**

The ultimate goal of the project is to remove institutional, economic, technical and financial barriers to the nation-wide development of renewable energy for isolated systems as well as main grid connected. The development objective of the project is to effectively promote renewable energy use through re-powering 4 islands of the Galapagos Archipelago with wind/PV diesel hybrid systems, thereby providing a model that can be used to promote renewable energy throughout the rest of mainland Ecuador.

This will allow to reduce gas emissions associated with electricity generation by 12 000 tons per year on the four inhabited islands of Galapagos Archipelago. A secondary objective is to reduce oil spill risks by the reduction of boats needed to transport oil products to the islands by 50% overall (from the current 1.9 to 2.1 million US gallons of diesel, 1 million will be avoided with the project) therefore improving biodiversity safeguard.

If these results can be replicated to mainland Ecuador, there exists the potential to reduce greenhouse gas emissions associated with electricity generation by potentially 0.5 to 1

million tons per year through the deployment renewable energy in Ecuador. (45% of the rural population or more than 2 million persons do not have access to electricity to date).

### **GEF PROJECT ALTERNATIVE**

The project will launch a comprehensive barrier removal effort in order to lay the groundwork for the construction and operation of four hybrid renewable-based electricity systems in the inhabited islands of the Galapagos Archipelago. The project has three components and will be carried out in two phases: The first component will initiate the process of barrier removal by laying the groundwork for the effective construction of generating capacities on the islands. This will include capacity building and strengthening of EEPG, detailed feasibility studies, establishment of joint ventures and signature of the Power Purchase Agreements with the utility EEPG. The second component, Phase 1, involves, among other activities, financial closure of projects and the construction of wind plants and PV systems on Floreana and San Cristobal (financed by private investors). Lessons learned from these two islands will benefit the electrification of Isabela and Santa Cruz, which are the focus of the third component, or Phase 2.

Components 2 and 3 will only be carried out as planned if the first component is judged to be successful. Otherwise, the resulting scenario will be evaluated and new strategies will be established in order to continue enhancing efforts to remove the remaining barriers. This strategy ensures an efficient use of resources, and provides a built-in review step for refocusing activities if and where necessary.

### **SYSTEM BOUNDARY**

The geographical boundary is limited to the four Galapagos islands. However the project is expected to have a strong impact on Ecuador energy sector development as a whole. It may also have positive impacts on the development of renewable energy in South America, especially since synergy will appear with other projects in neighbouring countries. Renewable energy based electrification is first implemented in the Galapagos islands, given the very unique situation of this Archipelago from a biodiversity standpoint. The idea is that the successful development of renewable-based energy systems in the Galapagos will have provided the contracting bases (Joint Venture legal set-up, Purchasing Power Agreement model and bidding procedures for renewable energy related equipment and services), and will allow partnership development with private project stakeholders from major utilities world-wide. The project will focus on off-grid generation, but will most likely have positive spill-over effects on the development of on-grid renewable energy in Ecuador as well.

### **ADDITIONAL BENEFITS**

Additional benefits of the project include reduced oil spills risks, reduced dependence on fossil fuels and therefore price fluctuations and scarcity, improved quality of electricity for the islanders and reduced subsidy needs due to lower operation costs, consistent with government objectives. The project is envisioned, at the state and local levels, as an opportunity to stimulate integrated natural reserve management patterns. This project will

be marketed so as to enhance tourism interest for new renewable, environmentally-friendly technologies, thereby increasing tourism inflow on the islands.

## **COSTS**

The total estimated costs of the project come to US\$ 25,110,000 (not including US\$ 283,100 for PDF B activities). Of this total the estimated baseline costs are US\$ 17,083,500 while US\$ 8,026,500 are the estimated incremental costs of the project. From the GEF, US\$ 3,800,000 (excluding PDF resources) is sought to cover approximately 15% of the alternative project intervention costs. The Government of Ecuador will provide US\$ 3,950,000 through the FERUM and US\$ 350,000 in kind. In addition, US\$ 17,010,000 will be funded from national and international private sources of funding.

## **GLOBAL ENVIRONMENTAL BENEFITS**

According to projections for installed capacity and foreseen production of renewable energy, an annual 12 000 ton per year by 2011 or 240 000 tons over the twenty-year project life. The Unit Abatement Cost of the GEF contribution comes to US\$ 17 per ton of CO<sub>2</sub>.

**Table A-1 Incremental Cost Matrix**

<b>Project Activity</b>	<b>Baseline</b>	<b>Alternative</b>	<b>Increment</b>
<p><b>Component 1. comprehensive feasibility study for repowering, establishment of joint ventures and elaboration and signature of PPA.</b></p>	<p>Considering its very specific situation, the vertically integrated utility of Galapagos, will remain as such and dedicate most of its efforts to improving operation of existing diesel plants.</p> <p>Repowering would take place on a public budget linked principles, Diesel would be favoured despite good will to implement renewable energy.</p> <p>Awareness of EEPG staff on renewable energy and on new operational modes such as BOT and BLT will remain at their actual level. EEPG will become an isolated utility in the Ecuadorian context.</p> <p><i>Cost: US\$ 0</i></p>	<p>Detailed feasibility studies will be carried out as a technical basis for Joint Venture arrangements on each of the four islands.</p> <p>The exact mechanism of participation of EEPG in the Joint Ventures will be studied in relation to the legal and regulatory context of this particular utility.</p> <p>Up to four Joint Ventures will be established, possibly one for each island.</p> <p>A thorough review of the current financial flows in the Galapagos system will be necessary to elaborate power purchase agreements compatible with the local situation and operation of EEPG</p> <p>A comprehensive capacity building programme will be undertaken within EEPG, in collaboration with the Ministry of Energy and Mines and other utilities and institutions of the energy sector.</p> <p><i>Cost: US\$ 200,000 (GEF) US\$ 50,000 (GOM)</i></p> <hr/> <p><i>US\$ 250 000 (total)</i></p>	<p>Institutional, legal and regulatory basis that will stimulate Ecuador renewable energy market and private participation.</p> <p>Legal basis to establish Joint ventures for renewable energy project in the local context.</p> <p>Clear description of financial flows and basis for Purchasing Power Agreements for renewable energy electrification in the Ecuadorian electricity market.</p> <p>Increased awareness among government officials of the benefits of renewable energy</p> <p>EEPG is able to negotiate for IPPs and PPAs.</p> <p>Other institutions and utilities of the sector are better aware of IPP/PPAs</p> <p><i>Incremental cost: US\$ 250,000</i></p>
<p><b>Component 2. Procurement, construction and commissioning of plants (hybrid, wind PV and diesel for Floreana and San Cristobal. Possible construction of hydropower plant on San Cristobal.</b></p>	<p>Floreana and San Cristobal are repowered with diesel generation plants.</p> <p>Around 500 000 US gallons of Diesel will be necessary to meet electricity generation needs.</p> <p>Oils spills risks will be as of today with the shadow of the Jessica tanker spilling 75</p>	<p>On each of the two islands, the newly established joint venture will issue a competitive bid for procurement of equipment</p> <p>Facilities testing and commissioning will take place so that the renewable energy based electrification of Floreana and San Cristobal are effective.</p>	<p>EEPG is better managed. Capacity building is effectively taking place.</p> <p>Environmental benefits of renewable energy will be better known to decision-makers in Ecuador.</p> <p>The project will allow EEPG to have access to hands-on information and</p>

	<p>000 gallons of industrial fuel and 70 000 tons of diesel in the fragile local environment.</p> <p>Total investment US\$ 1 602 900  Total O&amp;M costs US\$ 5,065,600  -----  Total cost US\$ 6,668,500</p>	<p>O&amp;M procedures will be established and implemented.</p> <p>Day-to-day working relationship built up among EEPG and private project stakeholders.</p> <p>A comprehensive capacity building programme implemented within EEPG.</p> <p>Investment cost US\$ 4,280,900  O&amp;M cost US\$ 2,367,100  -----  Total US\$ 6,648,000</p> <p>Costs: US\$, 350,000 (GEF)  US\$, 250,000 (GOM)  US\$ 6,300,000 (private)  -----  US\$ 9,900,000 (total)</p>	<p>best management.</p> <p>Competitive bidding will allow effective verification the level of prices applicable to the Galapagos Archipelago.</p> <p>Testing and commissioning procedures will be carried out by the joint venture under best international practice and again, EEPG through its participation in the Joint Venture will access knowledge on this item.</p> <p>EEPG is able to manage IPPs and monitor PPAs</p> <p><i>Incremental cost related to investment and O&amp;M US\$ - 20,500</i></p> <p><i>Total incremental cost US\$ 231,500</i></p>
<p><b>Component 3. Renewable energy based electrification of Santa Cruz and Isabela.</b></p>	<p><i>These two islands would be re-powered with diesel engines as needs emerge. This would imply transport and consumption of around 700 000 US gallons of Diesel per year.</i></p> <p><i>Investment cost US\$ 1, 997,700  O&amp;M costs US\$ 8,417,300  -----  Total US\$ 10 415 000</i></p>	<p>The process for re-powering Santa Cruz and Isabela follows the process described above so that this second phase builds on the experience of San Cristobal and Floreana.</p> <p>Better knowledge of the paths for IPP/PPA set up.</p> <p>Better sizing of the equipment in relation to local needs and better estimation of costs based on the competitive bidding.</p> <p>Possibly improved operation and maintenance.</p> <p>Investment cost US\$ 12,618,500  O&amp;M costs US\$ 5,041,600</p>	<p>An estimated 7 000 ton of CO2 per year will be avoided.</p> <p>The investors' perception of level of risks (political, commercial, technical), for renewable energy projects in Ecuador will be improved.</p> <p>The Galapagos Archipelago will be taken as a demonstration site for integrated biodiversity and climate change management and tourism will develop around this concept as well..</p> <p><i>Incremental cost related to investments and O&amp;M costs</i></p>

		<p style="text-align: right;">-----</p> <p>Total US\$ 17,660,100</p> <p>Cost: US\$ 3,000,000 (GEF)  US\$ 3,950,000 (GOM)  US\$ 10,710,100 (private)</p> <hr style="width: 20%; margin-left: auto; margin-right: auto;"/> <p style="text-align: right;"><i>US \$ 17,660,100 (total)</i></p>	<p style="text-align: right;"><i>US\$ 7,245,100</i></p> <p><i>Total incremental cost US\$ 7,245,100</i></p>
<b>Project monitoring and evaluation</b>	<p>No monitoring in the baseline scenario</p> <p>Cost US\$ 0</p>	<p>Monitoring and evaluation is integrated within project management throughout project development. Project ex-post analysis is carried out and published.</p> <p>A promotion programme, with technical background information will be carried out, the main target being government decision-makers and all public and private firms involved in the electricity sector.</p> <p>A brochure presenting the main feature, visual impact, costs, biodiversity benefits will be produced and widely available and media will be associated to project promotion.</p> <p>Costs: US\$, 250,000 (GEF)  US\$, 50,000 (GOM)</p> <hr style="width: 20%; margin-left: auto; margin-right: auto;"/> <p style="text-align: right;"><i>US\$ 300,000 (total)</i></p>	<p>Project development is in line with management best practice and risk assessment takes into account new conditions as they arise.</p> <p>IPP/PPA operation for renewable energy becomes a model for the mainland.</p> <p>The Galapagos renewable energy electrification project acquires a wide demonstration level with media coverage.</p> <p>Incremental cost US\$ 300 000</p>
<b>Global Environmental Benefits</b>	<p>In the baseline scenario there the bulk of new electricity supply for off-grid systems will be provided using diesel, and along with unbundling and private sector participation future power plants to be connected to the main grid will be either combined cycle or gas turbines, using fossil fuels.</p>	<p>Within 10 years, decision making for new investment will integrate the benefits of renewable energy. For electrification of the 2 million persons not having electricity, renewable energy will be chosen whenever economic analysis show a lower global cost for this option..</p> <p>On-grid renewable technologies will also</p>	<p>A total of 12 000 ton of CO2 will be avoided annually in the Galapagos Archipelago.</p> <p>Oil spills risks are reduced by 50% for these 2 islands and risks related to electricity generation are negligible.</p> <p>An example of integrated</p>

	Therefore GHG emissions in Ecuador energy sector will continue to rise as is projected.	develop as general knowledge and experience is gained.	management of natural reserves, including renewable energy option exists and is replicable world-wide.
<b>Domestic Environmental Benefits</b>	There will be no or very limited development of renewable energy in Ecuador	Within 10 years, Ecuador will have built partnership with private investors to implement renewable energy based electrification nation-wide.	Trained personnel in renewable energy development.  Development of partnership for renewable energy implementation.
<b>Costs</b>	<b>Total: US\$ 17,083,500</b>	<b>Total:</b> <b>US\$ 3,800,000 (GEF)</b> <b>US\$ 4,300,000 (GOM)</b> <b>US\$ 17,010,000(Private)</b>  <b>Total:</b> <b>US\$ 25,110,000</b>	<b>Total incremental cost: US\$ 8,026,500</b>



## ANNEX B – PROJECT PLANNING MATRIX

NARRATIVE SUMMARY	OBJECTIVITY-VERIFIABLE INDICATORS	MEANS OF VERIFICATION	CRITICAL ASSUMPTIONS
<p><b>Global objective :</b>To reduce Ecuador’s energy-related CO2 emissions by substituting PV and wind energy for fossil fuel (mainly diesel) utilised in electricity generation</p> <p><b>Development Objective:</b> To promote the utilisation of renewable energy (PV and Wind) for electricity generation, thus reducing Galapagos’ dependency on diesel shipped from continental Ecuador.</p>	<p>Quantity of fossil fuel displaced by renewable energy generation, and the resulting GHG emission reductions.</p> <p>MWh of renewable energy production.</p> <p>MW and MWh of renewable energy based generation in the national Ecuadorian system.</p>	<p>Data generated from the performance reports from new renewable facilities, plus data from on annual electricity production and fuel consumption.</p>	<p>A regulatory framework that is fully supportive to the project objectives.</p> <p>Migration from continental Ecuador does not exceed planning targets.</p>
<p><b>Immediate Objective 1:</b> To support the national partners to complete the full feasibility and design of the systems for re-powering electricity generation on each of the islands.</p>	<p>Four islands successfully electrified by 2005.</p>	<p>EEPG annual report</p>	<p>Cooperation and commitment from all implicated institutions and companies.</p>
<p><b>Output 1:</b> Full feasibility and design completed, including more accurate cost estimates and an implementation schedule for repowering electricity generation on each of the 4 islands.</p>	<p>Feasibility studies produced by the end of 2002.</p>	<p>Study documents</p>	<p>Ecuador regulatory framework does not affect the project. Prices are calculated cost-based excluding all existing subsidies.</p>
<p><b>Output 2:</b> Legal and operational agreements for the establishment of joint ventures to build, own and operate the generation plants established.</p>	<p>Two joint venture exist by the mid 2002. General principles are available to other utilities.</p>	<p>Official publication.</p>	
<p><b>Output 3:</b> Power purchase agreements between each joint venture and EEPG prepared..</p>	<p>Purchasing Power Agreements are signed by the end of 2002. Main principles are available for other utilities.</p>		

<b>Immediate Objective 2:</b> To facilitate repowering on Floreana and San Cristobal with PV/wind/diesel hybrid electricity generating systems through strengthening the institutional capacity of the national partners.	EEPG staff trained and able to negotiate the terms on joint venture and PPA.	Reports from training courses.	Cooperation and commitment from all implicated institutions and companies.
<b>Output 1:</b> CONELEC and EEPG' s capacity related to design and negotiate Independent Power Producer (IPP) schemes and Power Purchase Agreements (PPAs) strengthened.	Existence of management procedures for IPP contracts.	EEPG files.	
<b>Output 2:</b> EEPG' s capacity to design and negotiate contractual arrangements for operation and maintenance strengthened.	Number of technicians trained in the operation and maintenance of wind turbines, PV systems and batteries per year until 2004.  Completion and dissemination of a Best Practices Manual, including quality standards, continuity of service, environmental practices, etc.by the end of 2003.	Reports from training courses and EEPG.	
<b>Immediate Objective 3:</b> To facilitate repowering on Isabela and Santa Cruz with PV/wind/diesel hybrid electricity generating systems.”	Construction and commissioning of wind power plants, PV and batteries by the end of 2004 for Isabela and Santa Cruz.	Project report and EEPG annual report	There is sufficient interest on the part of private sector companies.
<b>Output 1:</b> PV-wind-diesel hybrid system repowered and in operation for Santa Cruz	Construction and commissioning of wind power plants, PV and batteries by the end of 2004.	Project report and EEPG annual report	Sustained and full cooperation of government and firms  No negative impact of the national regulatory framework on project development
<b>Output 2:</b> PV-diesel hybrid system repowered and in operation for Isabela.	Construction and commissioning of PV and batteries by the end of 2004.	Project report and EEPG annual report	Sustained and full cooperation of government and firms  No negative impact of the national regulatory framework on project development
<b>Immediate Objective 4:</b> Disseminate experiences from the repowering of Floreana and San Cristobal to Phase II	Number of additional renewable energy projects (MWs) in	Official documents from EEPG such as yearly reports	Before the end of Phase I, there are sufficient investors fully committed to

and support replication efforts on the mainland and throughout the region	subsequent years.	Official information from CONELEC	the project phase II and to repowering on the mainland and throughout the region. Successful implementation of the joint ventures on all four islands.
<b>Output 1:</b> Initiation of a national programme in Ecuador to replicate the use of solar and wind and other renewable energy resources such as micro/mini-hydro and biomass to generate electricity to supply isolated mini-grids and the national grid supported.	Existence of a national replication programme by the end of the project.	Official documents.	

## **ANNEX C - STAP REVIEW**

### **Technical Review of Galapagos Project Brief Daniel H. Bouille**

#### **PROJECT BRIEF**

Renewable Energy for Electricity Generation – Renewable Electrification of the Galapagos Islands is a proposal for a Project to be executed by DEA (Department for Alternative Energy, Ministry of Energy and Mines), during three years with a total Project Cost of US\$ 25,41 Million: a national support of US\$ 4,3 Million, US\$ 4,1 Million from GEF including US\$ 0,3 Million as PDF allocation and 17,01 from investors (including E7).

It is a Project “to reduce Ecuador’s energy-related CO2 emissions by introducing PV and wind energy as a substitute for fossil fuels utilized in electricity generation, specifically for the Galapagos Archipelago. In addition, the project will substantially decrease the volume of diesel annually shipped to the island, thereby reducing the environmental threat of an oil spill that can cause great damage to the biodiversity found in and around the coastal ecosystem of the islands.”

In general terms and having in mind the importance of the Study Case as demonstrative action of the possibilities of Renewable, is a very good proposal with a reasonable budget, an important contribution of private investors and a learning by doing process that surely would be of interest not only for the country but mainly at a regional and international level.

It would be very important to stress the possibilities of cooperation with other projects within the country and with other countries in the region, as well as the sharing of results of the Project with other developing countries.

The background and Context chapter is a good synthetic diagnosis of the Archipelago energy situation, especially the current situation and the potential risks, local and global in Biodiversity.

It is very important that the project not only address the Climate Change issue, but, overall, the Biodiversity problems and risks for the islands, related to Diesel Oil transportation.

As the particular suggestions/remarks to the preliminary Project Brief were made in advance, I only included in this report the main conclusion, related to the revised version of the Project Brief.

#### **MAIN CONCLUSIONS**

As a synthesis, we can say that the project proposal will have very important benefits at the global level in Galapagos, in relation with the Climate Change Issue and their consequences in the short and long term, but especially is particularly relevant for Biodiversity Conservation.

In order to increase the benefits at the regional level it would be important to considered how to share the results of the project with other developing countries.

The risks for the development of the project are low, or all of them under control, taking into account the good institutional structure developed, the technical support and the availability of funds from the GEF and Private Investors, as well as the National Government direct involvement in the project.

The global environmental benefits of the project are quite clear and the extrapolation of the results of the implementation of renewable in a new institutional framework to other regions will mean important benefits regional and international.

As a consequence the project also fits quite importantly in the context of the goals related with Biodiversity issues.

The structure and organization proposed for the project, give enough support to the future sustainability of the proposed activities, provided that economic resources are available for this type of basic and applied research, related with an issue of interest both for the international system, private investors and for the country.

## **ANNEX D - RESPONSE TO STAP REVIEW**

The current STAP review is the result of project Brief improvement based on a draft STAP review, which allowed improving project design in the following areas:

- The relation between project implementation and barriers identified within the PDF B has been made clearer.
- The replication process has been better presented, so as to show clearly project future impact on the Ecuadorian national electricity system.
- A more detailed description of activities related to technical assistance has been provided.
- The current choice for institutional set up with IPPs for each island has been justified as being the best option in this particular case. A direct partnership with EEPG may not be legally feasible.
- Responding to the concern of –risk sharing - Risk sharing between the IPPs and EEPG has been explained. It will be consistent with current practice worldwide. The PPA will contemplate a penalty in case of non delivery of service as agreed
- Possible impacts of the electricity reform on project have been evaluated. It is negligible since EEPG is to remain vertically integrated by law.
- Responding to the concern of environmental impact of the new plant-Environmental impact of the new renewable plants has been assessed and is minimal. This is now explained in the Brief. Furthermore, all local related rules and regulations would be followed.

The STAP review emphasizes the importance of the project on Biodiversity. Renewable Energy for the Galapagos Islands is at the crossroad between Climate Change and Biodiversity. Nevertheless, considering that there are no specific activities and no specific costs related to biodiversity, the project falls under Operational Programme #6.

Sharing project results with other institutions on the mainland will be taken care of during project implementation, through their participation in the project. Sharing project results with other countries will be part of the missions UNDP-GEF undertakes through, for instance, Country Dialogue Workshops; successful projects are also presented as examples within GEF public documentation.

**ANNEX E - ENDORSEMENT LETTER**

(attached PDF file)