Document of
The World Bank

Report No: 58555-CR

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED PURCHASE OF EMISSIONS REDUCTIONS

FROM THE PROTOTYPE CARBON FUND

IN THE AMOUNT OF UP TO US$10 MILLION

TO THE

REPUBLIC OF COSTA RICA

FOR THE

PCF UMBRELLA PROJECT FOR RENEWABLE ENERGY SOURCES

July 31, 2002

Finance, Private Sector, and Infrastructure
Central America Department
Latin America and the Caribbean Regional Office

CURRENCY EQUIVALENTS
(Exchange Rate Effective September 30, 2001)

Currency Unit = Colones
1 LC = 0.003US$
US$1 = 331.87LC

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

ACOPE	Costa Rican Association of Energy Producers *(Asociación Costarricense de Productores de Energía*)
AIJ	Activities Implemented Jointly
ARESEP	Public Services Regulatory Authority (*Autoridad Reguladora de los Servicios Públicos)*
BOT	Build, Operate and Transfer
CAS	Country Assistance Strategy
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CNFL	National Power and Light Company *(Compañia Nacional de Fuerza y Luz)*
CO_2	Carbon Dioxide
CTO	Certified Tradable Offset
EIA	Environmental Impact Assessment
ER	Emission Reductions
ERPA	Emission Reductions Purchase Agreement
ESP	Environmental Service Payments
FRER	Fund for Renewable Energy Resources
FIRR	Financial Internal Rate of Return
FONAFIFO	National Fund for Forestry Finance (*Fondo Nacional de Financiamiento Forestal*)
FUNDECOR	Foundation for the Central Volcanic Cordillera (*Fundación para la Cordillera Volcánica Central*)
FY	Fiscal Year
GHG	Greenhouse Gas
GOCR	Government of Costa Rica
GWh	Gigawatt hours
HCA	Host Country Agreement
IBRD	International Bank for Reconstruction and Development
ICE	Costa Rican Institute for Electricity *(Instituto Costarricense de Electricidad)*
IDB	Inter.-American Development Bank
INBio	National Biodiversity Institute (*Instituto Nacional de Biodiversidad*)
IUCN	World Conservation Union
JI	Joint Implementation
LRMC	Long Run Marginal Costs
MtCO2e	Metric tons of carbon dioxide equivalent
MINAE	Ministry of Environment & Energy *(Ministerio de Ambiente y Energía)*
MVP	Monitoring and Verification Plan
OCIC	Costa Rican Office for Joint Implementation *(Oficina Costarricense de Implementación Conjunta)*
PCF	Prototype Carbon Fund
PPA	Power Purchase Agreement
RE	Renewable Energy
SEA	Sectoral Environmental Assessment

SETENA	National Environmental Technical Secretariat
SIEPAC	System of Interconnection for the Central American Countries
SINAC	National System of Conservation Areas *(Sistema Nacional de Areas de Conservación*)
SNE	National Electricity Service (Servicio Nacional de Electricidad)
SSA	Sectoral Social Assessments
UNFCCC	United Nations Framework Convention on Climate Change

Vice President: David de Ferranti
Country Director: Donna Dowsett-Coirolo
Sector Director: Danny Leipziger
Task Managers: Guillermo Ruan/Eduardo Zolezzi

Costa Rica
PCF Umbrella Project for Renewable Energy Sources

CONTENTS

Costa Rica
PCF Umbrella Project

Project Appraisal Document

Latin America and the Caribbean Regional Office
Central America Department

Date: March 13, 2002
Country Manager/Director: Donna Dowsett-Coirolo
Project ID: P076421
Lending Instrument: N/A

Team Leader: Guillermo Ruan/Eduardo Zolezzi
Sector Manager/Director: Danny Leipziger
Sector: LE
Theme(s): 39, 81, 78
Poverty Targeted Intervention: [ ]

Project Financing Data

[ ] Loan [ ] Credit [ ] Grant [ ] Guarantee [X] Other: Prototype Carbon Fund

For Loans/Credits/Others:
Amount (US$m): up to **US$10 Million**

Financing plan:

Source	Local	Foreign	Total
Public Sector and Private Sector developers for three subprojects (estimate)			48.6
Revenues from emission reduction credits (including PCF) for three subprojects (up to)			2.5
Total			51.0

Recipient: Public Sector and Private Sector Renewable Energy Developers
Responsible agency:
Costa Rican Office on Joint Implementation (OCIC)
P.O. Box 7170-1000
San José, Costa Rica
Contact Person: Paulo Manso, General Manager
Tel: (506) 290-1283 Fax: (506) 290-1238 E-mail: crocic@racsa.co.cr
Project implementation period: 2002 – 2017

Carbon Emissions Reductions Data
Estimated emission reductions (mtCO2e) over 14-years period: 719,440 mtCO2e (cumulative of the first three subprojects.

Expected effectiveness date: September 1, 2002
Expected closing date: December 31, 2017

A: Project Development Objective

1. Project development objective:

The objective of the Umbrella Project is to support development of an international market mechanism for the new commodity known as "Emission Reductions" (ER), under the framework of the Kyoto Protocol. In this particular case, the project will function as an umbrella to facilitate the implementation of several subprojects in Costa Rica of which three are presented for approval at this time. The subprojects produce reductions of CO2 emissions through substituting electricity produced by thermal plants with electricity from renewable sources.

The Umbrella Project is supported by the Prototype Carbon Fund (PCF). PCF supports projects that produce high quality greenhouse gas ER which could be registered with the United Nations Framework Convention on Climate Change (UNFCCC) for the purposes of the Kyoto Protocol. The objective of the PCF is to develop experience through a "learning-by-doing" approach, applying Clean Development Mechanism (CDM) and Joint Implementation (JI) processes of the Kyoto Protocol.

2. Key performance indicators:

- Certified ER of 719,440 metric tons of carbon dioxide equivalent (mtCO2e) produced by the first three subprojects over a year crediting period

B: Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project:

Document number: P-5912 - CR Date of latest CAS discussion: April 15, 1993

The most recent Country Assistance Strategy (CAS) emphasized the importance of environmental management. A new CAS is currently under preparation, which likewise, will continue to emphasize environmental issues and point out that higher and sustained economic growth in Costa Rica depends on the Government's success in strengthening the outward-orientation of the economy and increasing the role of the private sector. The proposed Umbrella Project directly supports improved incentives for private sector-led growth, and improved environmental management through the promotion of diverse renewable energy technologies.

1.a Global Operational Strategy/Program objective addressed by the project

The Umbrella Project supports the PCF global objectives:

High-Quality Emission Reductions
The PCF supports funding of projects that produce high quality greenhouse gas ER which could be registered with the United Nations Framework Convention on Climate Change (UNFCCC) for the purposes of the Kyoto Protocol.

Knowledge
By transacting the business of reducing greenhouse gas emissions, the PCF is developing a knowledge base of business processes and practices to facilitate climate-friendly investment and inform the ongoing UNFCCC negotiations.

Public-Private Partnership
PCF resources are provided by both the public and private sectors. The PCF demonstrates how insights and experience from both sectors can be pooled to mobilize additional resources for sustainable development and address global environmental concerns.

2. Main sector issues and Government strategy:

Sector Overview

Costa Rica's installed generation capacity in 2000 amounted to 1,654 MW of which 1,233 MW was hydroelectric, 234 MW thermoelectric, 137 geothermal, and 50 MW wind and biomass. Total generation in 2000 amounted to 6,349 GWh.

Electricity demand has grown steadily at a rate of 5-6% per year in the period 1990-2000 and the service coverage has reached 93% nationwide. The power market includes the national interconnected system and limited interchanges with neighboring countries. It is foreseen that in the future Costa Rica's power system will be part of the Central American regional electricity market.

The Costa Rican Institute for Electricity (ICE), a state-owned, vertically integrated utility, has the general responsibility to ensure electricity supply. ICE owns 98.6% of the shares of the National Power and Light Company (CNFL) which is the largest distributor of electricity in Costa Rica, accounting for 46% of the electrical market in the country. Created in 1941, it mainly operates in the San Jose Metropolitan Area where it services 383,000 clients. CNFL is also the second largest generator in the country after ICE with 85MW of installed capacity in 8 hydroelectric plants.

In addition to CNFL there are two municipal companies (JASEC and ESPH) which covered 10% of all electricity needs in 2000 and four cooperatives (COOPELESCA, COOPEGUANACASTE, COOPESANTOS, COOPEALFARO-RUIZ) which are involved in electricity distribution. These cooperatives also own some generation. These cooperatives sold 7.7% of all electricity in 2000.

ICE is responsible for generation (82%), high power transmission (100%) and distribution (41%). Power is also generated by CNFL (5%) and by the private sector (14%) through Build-Operate-Transfer (BOT) and Build-Operate-Leasing options. About 20-30 small independent generators and self-generators have entered the market since 1990 under limited conditions mostly to sell power to ICE and to distributors. In addition, municipal entities and rural electrification cooperatives also generate (8.5%) and distribute electricity (21%).

ICE is in charge of implementing the Government policies for the power sector, preparing expansion plans and executing most of them. ICE generates electricity and buys most of the production from the independent generators, transmits the electricity and distributes it to a significant portion of final users or to the other distribution companies. ICE is also in charge of the system operation and dispatch.

Regulatory Framework

Law No. 7329, Law for the Concession of Public Services, sets the legal framework for concessions and laws 7200 and 7508 govern the development of privately-owned power for sale to ICE using renewable resources.

Law No. 7329 (1993)

This law governs the concessions for public works and provides the framework for the assignment of public services to concessionaires. It mentions among others that all projects will be evaluated with regards to their impact on the environment by the Ministry of Environment and Energy (MINAE). It requires that foreign concessionaires either have a representation in Costa Rica or form a stock corporation (*sociedad anónima*) in Costa Rica.

The following two laws specify the conditions under which ICE can buy power from private power producers. Under both laws, private producers must use renewable resources to produce power.

Law No. 7200 (1990)

The law established that ICE could buy up to 15% of the total installed capacity from independent generators with plants not larger than 20 MW. The law also requires local ownership of at least 65% of the share capital. Project proposals were accepted in the order they were received, without a bidding process or the like. Tariffs had to be approved by SNE (now ARESEP, the Public Service Regulatory Authority). Currently, ICE is trying to renegotiate some of these Power Purchase Agreements (PPA). As of November 2001, there are 31 plants totaling 178MW of installed capacity under this regime.

Law No. 7508 (1995)

This law modified Law No. 7200, allowing ICE to buy an additional 15% of the total installed capacity in the system, raising the total to 30%. It also raised the maximum size of the units to 50 MW and reduces the required percentage of local capital participation to 35%. It also requires that the concessions for new (alternative and renewable energy) capacity be awarded under competitive bidding procedures, according to bid price and a technical, economic, and financial evaluation of the bidder's proposed project. Due to the bidding process, ARESEP is not required to approve the tariffs. Under this scheme, only one project is operational (the geothermal project Miravalles III). ICE has given preliminary awards to 3 additional projects with a total of 139 MW. The law authorizes ICE to enter into international agreements for electricity transactions with other regional or state-owned utilities, and allows mixed-ownership enterprises to

participate in the sector.

MINAE performs policy functions and is responsible for the supervision of ICE. According to the Law 7152, MINAE is also the governmental agency responsible for granting natural resources concessions (e.g. water, geothermal). ICE, however, does not require concessions from MINAE as its constitutive law gives ICE the right of use of natural resources for electricity supply.

MINAE's rights to issue concessions have been contested in court recently when the Constitutional Tribunal rejected as invalid a decree that granted water rights to a private generator. This is an issue that is deterring implementation of some private power projects. However, a recent ruling gave MINAE the authority to grant water concessions to BOT-type plants under Law 7508.

The 1996 Public Services Regulatory Authority Law created ARESEP, a multi-sector agency in charge of regulating the power, telecommunications, hydrocarbon, irrigation, public transportation, maritime and air services, rail cargo transportation and waste disposal. ARESEP has a high degree of autonomy for regulating public services. It is in charge of setting the prices and tariffs for the industry and exerts regulatory oversight over the operating companies. It is also in charge of organizing public auctions to award new independent generation projects.

The following table provides an overview over the concessions that the different players are required to obtain in order to generate electricity. In case of hydropower, a water use concession might be required if it is a private generation company.

Table 1: Who needs which concession?

	Water	**Service (Generation)**
ICE	Not required	Not required
CNFL	Required	Not required
Municipal Companies JASEC (Cartago), ESPH (Heredia)	Required	Required
Cooperatives (COOPELESCA, COOPEGUANACASTE, COOPESANTOS, COOPEALFARORUIZ)	Required	Required

Development of Private Power

After opening the sector to private participation in 1990 under Law No. 7200 (modified in 1995 by Law No. 7508), a number of private generators with an aggregate capacity of 210 MW have secured contracts to provide power to ICE. Participation of private generators in the total production of ICE has steadily grown and now represents 14% of the total generation.

The regional treaty for the creation of the Central American common market signed by Costa Rica, requires the national utilities to separate their activities and the signatory countries to move towards power competitive markets. This has not happened in Costa Rica. A bill sent to

Congress by the Government that would have unbundled ICE's activities and created a bulk supply market failed to be approved and was withdrawn by the Government in view of popular opposition ignited by ICE's unionized workforce. Currently, any initiatives to reform the sector are being put on hold.

At the same time, ICE is experiencing serious difficulties to finance its expansion plan due to limitations imposed on the country's total debt. The supply is not totally secured for the next few years for lack of investment in the expansion of new system capacity. This improves the prospects for private participation. In fact ICE's current expansion plan considers a major contribution from private generators, which are being selected through public bidding processes with ARESEP's oversight.

Electricity Pricing/Tariffs

In accordance with current regulations, ICE must present tariff schedules to ARESEP for approval. ARESEP has to be satisfied with the reasonableness of project costs (investment and operation) and with the impact these costs will have on the tariff for the end user. Bulk power rate-setting criteria include (but seem not to be limited to) long-term and short-term marginal costs as well as avoided costs. ARESEP has no obligation to approve tariffs as presented by ICE and in fact ARESEP has made its own estimates for the long run marginal costs (LRMC) in the past. Moreover, in view of political difficulties ICE has been asked not to present applications for tariffs adjustments in the last two years.

ARESEP approves the prices for ICE's purchases from independent generators (for the 15-year contract term). Some supply contracts contain price adjustment clauses that have resulted in substantial increases over and above the current LRMC due to the devaluation of the Colon and fuel price increases. These contracts represent an important financial drain for ICE, as it cannot increase its bulk tariffs while purchases from some private suppliers have grown substantially.

The tariff structure used by ICE for power purchases from private generators is based on time-of-day and season and includes energy and capacity (power) charges. The following tables shows examples of tariffs approved by ARESEP for power sold to ICE by Molinos de Viento del Arenal, S.A. (wind power project) and P.H. Río Volcan, S.A. (hydro power project).

Table 2: Integrated Price for Power and Energy in US$/kWh

	Dry Season (January-August)		Wet Season (September-December)	
Time of Day:	Molinos	Río Volcan	Molinos	Río Volcan
Peak	0.100	0.104	0.079	0.083
Off-Peak	0.068	0.071	0.041	0.039

Source: La Gaceta No. 191, October 4, 2001

Government Strategy

ICE prepares an optimal expansion plan for the Costa Rican power system based on demand projections, the capacity of the existing system, candidates for supply expansion and economic parameters. Demand projections indicate that consumption will grow from the current 1654 MW to 3317 MW.

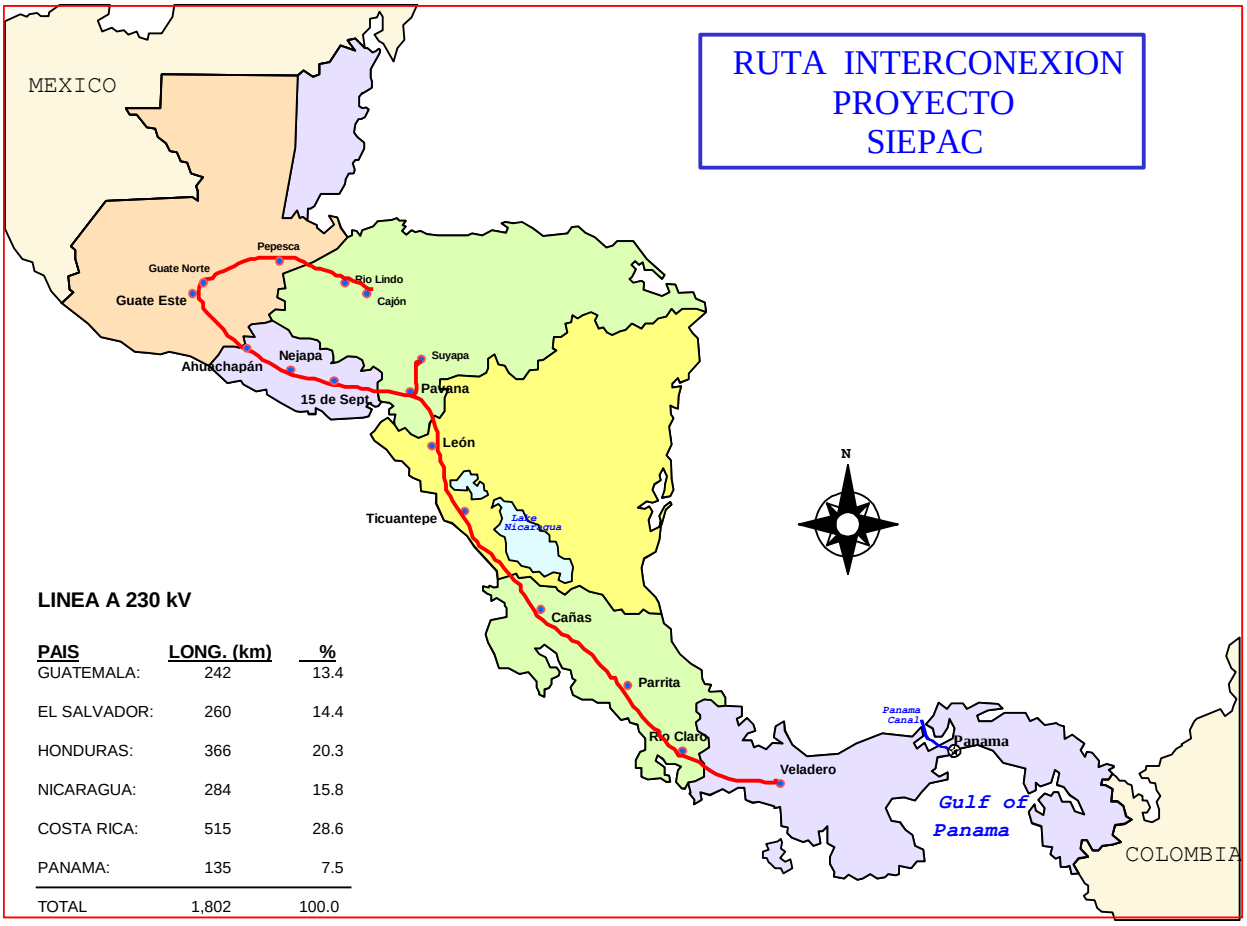
This plan requires a yearly investment of approximately US$130 million and represents a significant expansion compared to previous periods. To achieve this growth in generation capacity, private investment is necessary.

***Regional developments*:**
Recent developments in the region include a 50 MW BOO ("Build-Own-Operate") project in Nicaragua awarded to a private consortium, with a total blended rate (energy and capacity payments) of US$0.0575/kWh using Wartsila diesel internal combustion engines. Additional thermal projects are likely to be developed in the short term as they are faster to implement and more competitive in terms of capital costs than renewable energy projects. Thermal prices are, on average, US$450-US$700 per installed kW for natural gas or fuel oil systems versus US$1,500 per installed kW for hydropower projects in Costa Rica. Renewable energy projects in neighboring countries typically exceed US$2,000 per installed kW. It is generally expected that competitive bids for large thermal projects will drive the regional generation price lower into the range of US$0.045-0.060/kWh, despite recent increases in world oil prices.

Furthermore, in addition to the six percent annual increase in domestic demand for electricity, public and private sector developers have examined the potential for energy exports to neighboring countries. ICE has 40 MW of excess transmission capacity available and routinely trades power with utilities in Nicaragua and Honduras. Such trade builds upon the 1996 Treaty on Electricity Markets of Central America, signed by the Presidents of the six nations of Central America and ratified by the respective National Congresses, creating one regional electricity market and supporting the interconnection of electricity systems in Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama.

Complementing the 1996 treaty, the System of Electrical Interconnection of the Countries of Central America (SIEPAC) project, financed in part by the Government of Spain and the Inter-American Development Bank (IDB), plans to upgrade the existing six-nation electrical network (see Figure 1). It is expected that SIEPAC will increase Costa Rica's cross border transmission capacity to 300 MW, and consequently increase considerably the import/export potential for electricity trading in Costa Rica. In case that AES builds a proposed 800 MW plant in Honduras and the SIEPAC is functional, ICE may face cheap energy imports that would compete with domestic generation.

Figure 1: SIEPAC Transmission Interconnection Route in Central America



PAIS	LONG. (km)	%
GUATEMALA:	242	13.4
EL SALVADOR:	260	14.4
HONDURAS:	366	20.3
NICARAGUA:	284	15.8
COSTA RICA:	515	28.6
PANAMA:	135	7.5
TOTAL	1,802	100.0

3. Sector issues to be addressed by the project and strategic choices:

The Umbrella Project aims to generate high quality ERs by Costa Rican private and public sector renewable energy developers and support the development of global markets of this new internationally-recognized financial instrument based upon the sustainable use of natural resources.

Costa Rica has an attractive pipeline of small, renewable energy projects, several of which will begin to produce ERs as early as 2002. These projects have the potential to replace some of the thermal generation plants in the short- and long-term when the sales of ERs allow public sector and/or private sector developers to lower their costs for installed capacity. Implementing guidelines for the proposed project and eligible subprojects will follow the guidance of the UNFCCC and the Kyoto Protocol in terms of independent baseline determination, third party validation, verification and certification of the ERs. Likewise, all eligible subprojects should comply with relevant World Bank environmental and social safeguard policies.

The project activity is consistent with the sector policies as it supports the use of renewable sources of energy.

Table 3. Initial Subprojects for Approval with Costa Rica Umbrella Project

Subproject Name	Renewable Energy Technology	Principal Subproject Sponsor	Total Subproject financing (US$ million)	Total ERs for 14-year purchasing period of PCF project(mtCO2e)
Chorotega	Wind; 8.4 MW	Turbowinds - Coopeguanacaste	17.3	262,660
Cote	Small hydropower; 6.3 MW	CNFL	10.9	172,120
Vara Blanca	Wind; 9.6MW	Turbowinds ESPH	20.3	284,660
Total			48.6	719,440

C: Project Description Summary

The proposed Umbrella Project will allow the PCF to provide funding for renewable energy subprojects. The following paragraphs contain short descriptions of the initial subprojects that are included with the approval of the umbrella project.

Cote Hydroelectric Subproject

The Cote Hydroelectric Subproject (CHS) will generate 6.3 MW using water from the Cote Lake. It is being developed by CNFL, as part of an overall development plan to increase its installed generation capacity to a total of 140 MW over 10 years. CHS will be constructed for CNFL by a group of private firms, the Consorcio Brasileño-Colombiano HidroCote, under a supervised turn-key contract. Consorcio HidroCote is a consortium of the Colombian firm, Gomez Cajiao y Asociados S.A. (design), and by the Brazilian firms Toshiba Do Brasil S.A. (electrical-mechanical equipment) and Termotécnica Coindustrial S.A. (construction).

The CHS takes advantage of the infrastructure already installed to divert water from Cote Lake to the ICE Arenal Reservoir. In 1982, ICE constructed a dam on the Cote River (the natural drain from the lake) converting the lake into a regulation reservoir. The existing water intake structure, tunnel and dam will be used by the project, although some modifications will be undertaken. New structures include a cap on the dam to increase its height by 1 m, an open canal, an additional tunnel, a pressure pipe, a forebay, a powerhouse containing a 6.3 MW Francis turbine, a substation located next to the powerhouse and sluice leading to the Rugama Creek. The powerhouse and substation will occupy an area of 18.5 ha. on land already highly altered from the Arenal Hydroelectric project. Water from the power house will be returned to the Rugama Creek for its ultimate discharge into the Arenal Reservoir.

The total emission reductions from Cote subproject for the 14-year period in which the PCF will purchase emissions reductions are about 170,000 mtCO2e (subject to negotiations).

Chorotega Wind Power Subproject

The Chorotega Eolic Subproject (CHES) is an initiative of Coopeguanacaste and the Belgian company Turbowinds, which jointly will develop the project in order to supply the increasing demand of Coopeguanacaste's zone. The project includes within its scheme the construction of 14 aerial generators of Turbowinds technology T 600-48 of 600 KW per unit for a total of 8.4 MW. Its area of influence is approximately 35 hectares, to be accessed by 2.5 km of road.

The construction of 3 km of transmission line will enable linking the site to a substation at Santa Cruz. The location was chosen after careful consideration of the economic, geophysical, environmental and settlement characteristics of the area. The 2-year mean wind speed is 6 m/s. The land owners (Finca Chorotega) will transfer the land to the project and the area will be put under a forestry management program.

The total emission reductions from Chorotega subproject for the 14-year period in which the PCF will purchase emissions reductions are 262,660 mtCO2e.

Vara Blanca Wind Power Subproject

The Vara Blanca Eolic Subproject (VBES) is an initiative of ESPH and the Belgian company Turbowinds, which jointly will develop the project. The project includes within its scheme the construction of 16 aerial generators of Turbowinds technology T-600-48 of 600 KW per unit for a total of 9.6 MW (generating between 20 and 22 GWh per year), with an area of influence of about 10 ha. A transmission line located along an existing public road which runs parallel to the existent distribution line, will allow the dispatch of the energy produced to the sub-station of ESPH in the center of the City of Heredia.

The technical studies have been completed. The studies indicate that the average wind speed at the site is approximately 7.14 m/s; and that there are no seismic or geologic problems.

The total emission reductions from Vara Blanca subproject for the 14-year period in which the PCF will purchase emissions reductions are 284,660 mtCO2e.

1. Project components:

Table 4: Project Costs and Funding Sources for the First Three Subprojects

Component	Sector	Indicative Costs (US$M)	Private and Public Sector Companies (US$M)	Value of total ERs	% of Total
A. Increase production of environmentally sustainable renewable energy	VM	48.6	48.6		95
B. Develop markets for high quality Emission Reductions	VI	2.4	0.0	2.4	05
	Total	51	486	2.4	100

2. Key policy and institutional reforms supported by the project:

The Umbrella Project supports Costa Rican policy of promoting private sector participation and renewable energy sources which is in line with CAS and sector policy. In addition, it will contribute to the promotion of the development of the market for high quality ERs in Costa Rica and internationally, and to the increased knowledge and understanding of the functioning of these markets.

3. Benefits and target population:

Directly, the Umbrella Project will have environmental benefits of reduced CO2 emissions of up to 719,440 mtCO2e for the first three subprojects. Any subprojects beyond the three being considered would increase this figure further. The project will also increase generation capacity in Costa Rica, but more importantly, it will have significant demonstration benefits, showing how the government and the private sector can benefit from the carbon trading mechanism. Therefore, indirectly, the Umbrella Project is expected to contribute to additional climate improvement that may be achieved through similar projects in the future.

4. Institutional and implementation arrangements:

Prototype Carbon Fund (PCF)

The Umbrella Project will receive carbon finance and project preparation/processing support from the PCF, which was established for the purposes of (i) demonstrating how project-based transactions in greenhouse gas emission reductions can contribute to the sustainable development of developing countries; (ii) sharing the knowledge gained in the course of such transactions with all interested parties; and (iii) demonstrating how the World Bank can work in partnership with the public and private sectors to mobilize new resources for its member countries while addressing global environmental concerns.

PCF purchases high quality greenhouse gas ER which could be registered with the UNFCCC for the purposes of the Kyoto Protocol. PCF enters into an irrevocable Energy Reduction Purchase Agreement (ERPA) and accompanying Monitoring Verification Plan (MVP) with "project sponsors", defining the quantity, price and other delivery conditions of ER to be purchased by

PCF, as well as accompanying institutional arrangements, including the monitoring and verification systems and methods. To increase the likelihood that the ER will be recognized by the Parties to the UNFCCC, independent experts provide baseline validation and verification/certification procedures for emissions reductions that respond to UNFCCC rules as they develop.

The ER estimates are based on the findings of a baseline study, carried out and validated by independent experts. The baseline study also certifies a project's "environmental additionality", as the Kyoto Protocol requires that "*reductions in emissions are additional to any that would occur in the absence of the certified project activity*". In other words, the project is additional if the scenario "with project" generates fewer greenhouse gas emission than the "baseline scenario".

To increase the likelihood that ERs acquired via ERPAs will satisfy the requirements of the UNFCCC and the Kyoto Protocol, the PCF will retain the services of internationally-recognized, fully independent third parties to: (i) provide Validation of the sector-wide Baseline; (ii) provide Validation of the subproject design, subproject specific Baseline Study (test of additionality against the sector-wide baseline) and MVP; as well as (iii) undertake periodic verification and certification of the ER generated by each subproject.

Following each verification, the PCF will require the independent third party contracted to perform the verification to issue a Verification and Certification Report that includes inter alia: (i) a statement of the amount of verified and certified ERs the subproject has generated in the relevant period, (ii) such other matters as may be required by the UNFCCC or Kyoto Protocol; and, (iii) verification of compliance with Bank Safeguard Policies. This approach ensures the creation of an environmental commodity that is recognized by existing Costa Rican laws and will conform in due course with the relevant international agreements. It is understood that these international guidelines may change, according to decisions of the Conference of the Parties to the UNFCCC and Kyoto Protocol.

The Umbrella Project will be guided by annual reviews during the construction phase of individual subprojects, during which Bank supervision missions would identify specific measures to: (i) address areas of implementation weaknesses, especially concerning the implementation of the Environmental Management Plans and social mitigation measures; (ii) accommodate changes in priorities; and (iii) ensure compliance with relevant policies and procedures. The project will be implemented over a fifteen-year period, encompassing 2002 – 2017.

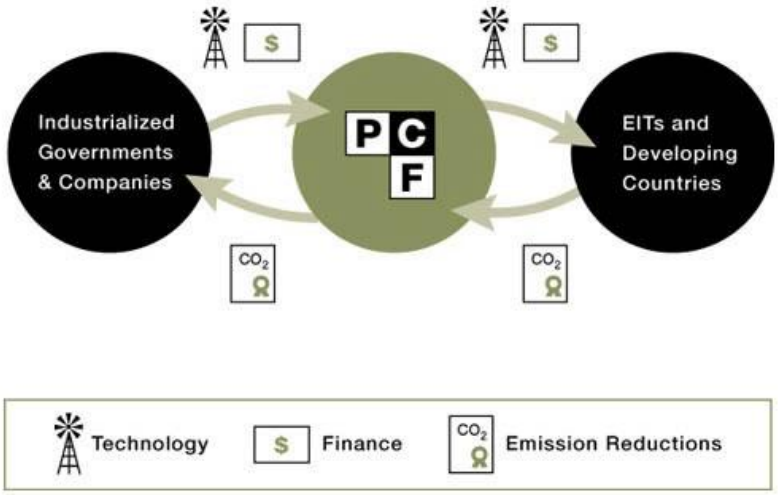
The subprojects under the Umbrella Project will be carried out by private corporations and/or parastatals. Apart from the PCF support, the project does not include any World Bank or IFC financing.

Implementation period: PCF involvement expires after the last ER purchase takes place. Accordingly, implementation period is maximum of 14 years from the commissioning of each subproject.

Figure 2: PCF Operational Structure

PCF operations:

Companies and Governments have contributed to the PCF which uses Fund resources to support projects designed to produce emission reductions fully consistent with the Kyoto Protocol and the emerging framework for Joint Implementation (JI) and the Clean Development Mechanism (CDM). Contributors, or "Participants", in the PCF receive a pro rata share of the emission reductions, verified and certified in accordance with carbon purchase agreements reached with the respective countries "hosting" the projects.



* EIT—Economies in Transition

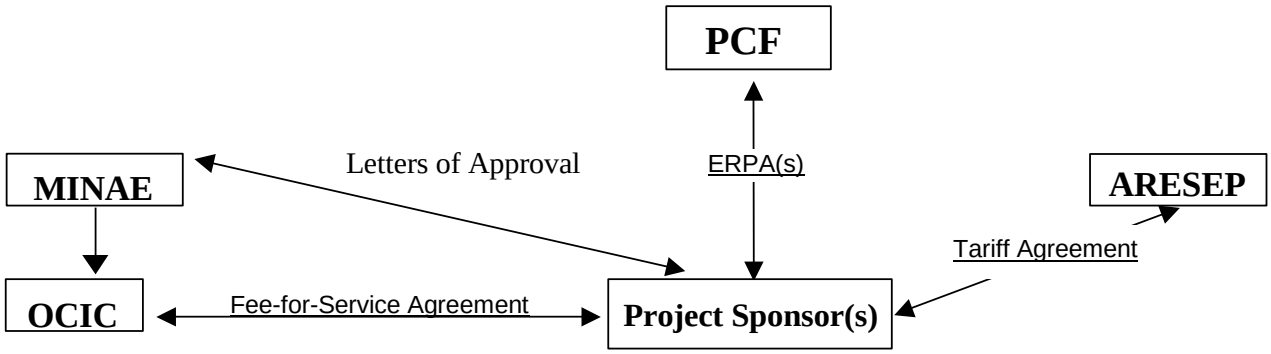
MINAE & OCIC

The principal Costa Rican institutions involved in the project are: (i) MINAE; (ii) OCIC, MINAE's Costa Rican Office on Joint Implementation; and (iii) public sector and private sector project sponsors that are eligible to sign ERPAs for eligible subprojects.

OCIC, is expected to (i) screen eligible renewable energy subprojects and coordinate subproject submissions to the PCF (ii) provide annual reports to national agencies (e.g., ARESEP) and international agencies (e.g., UNFCCC Secretariat), regarding the transfer of ERs to the PCF, and (iii) ensure that the agreed amount of any ERs achieved by each renewable energy subproject is transferred to the PCF.

MINAE on behalf of Costa Rica, will be expected to: (i) sign a Letter of Approval for each eligible subproject which will be provided by the authorized Costa Rican entity confirming that Costa Rica endorses the subproject for the purpose of Article 12 of the UNFCCC and the Kyoto Protocol to the UNFCCC, and that the subproject sponsor has ownership of any and all ERs generated by the project; and (ii) fully cooperate with the PCF, PCF Participants, and any Independent Third Party to ensure proper certification of Greenhouse Gas emission reductions in accordance with the UNFCCC and the Kyoto Protocol.

Figure 3. Institutional Arrangements for the PCF Umbrella Project



A. Renewable Energy Subproject Sponsors

The PCF will enter into irrevocable ERPAs with eligible renewable energy subprojects. Each ERPA will cover, *inter alia*, institutional roles and responsibilities for subproject implementation, and monitoring and verification obligations. The PCF shall only acquire ERs rights for those greenhouse gases defined in Annex A of the Kyoto Protocol. The criteria for ascertaining the quality of the ERs will be provided by the PCF under the guidance of the UNFCCC. Eligible renewable energy projects must demonstrate, *inter alia*, that their project is additional, as defined under the Kyoto Protocol, and that the ERs are measurable and verifiable following a protocol acceptable to the rules of the Clean Development Mechanism (CDM) or other UNFCCC bodies as necessary.

The ERPAs will define the minimum amount of ERs in metric tons of carbon dioxide equivalent that the eligible renewable energy subprojects will deliver to the PCF. Generation and delivery of the ERs shall be carried out in accordance to schedule set forth in the subproject ERPA and be completed on or prior to a date agreed upon between the PCF and each eligible subproject.

The PCF's total purchase of ERs from the Umbrella Project will not exceed US$ 10 million. This total will include project preparation expenses such as those related to baseline establishment, validation, monitoring, verification and certification. It would also include payments under sub-agreements, under which the eligible renewable energy subprojects would contract technical advice from qualified agencies such as OCIC. At the time of the signing of each ERPA, an anticipated schedule of payments based on the delivery of ERs will be prepared. The project sponsors shall make requests for payment to the PCF under the ERPA. The first payment from the PCF to each eligible renewable energy subproject will be agreed to in the ERPA and will occur upon declaration by the PCF that relevant conditions have been met. Thereafter, the PCF will only pay each eligible subproject upon successful transfer of ERs.

B. Process for Inclusion of Additional Subprojects

The Umbrella Project is set up to facilitate the inclusion of a number of relatively small

subprojects. With the approval of the Umbrella Project, three initial subprojects will be processed. Additional subprojects can be added to the Umbrella as they are submitted and processed by December 31, 2003. The process for their inclusion is as follows:

Project selection criteria

Consistent with the PCF project selection criteria and project cycle, additional subprojects have to meet the following requisites:

- The subproject clearly passes the additionality test as provided for by the Baseline Study for the Costa Rica Umbrella Project for Renewable Energy Sources;
- All World Bank Group Safeguards Policies (on Environmental Assessment, Natural Habitats, Involuntary Resettlement, etc.) have to be complied with;
- Subprojects should have undergone an appropriate bidding procedure or any other applicable due process required by Costa Rican law and sector policy, and documentation to this effect is provided to the PCF by OCIC;
- The cost of electricity produced should be acceptable to the end consumers and does not significantly distort average local electricity market prices;
- The proposed tariff should have been submitted to ARESEP for approval;
- Based on World Bank Operational Policy 4.37 and taking into account further guidance from the World Bank Latin America Region, PCF will only consider hydro power projects where all of the following criteria are met, unless advised otherwise by the World Bank Latin America Region: (i) the dam is lower than 10 meters, (ii) reservoir capacity is less than 1 million cubic meters, (iii) spillway capacity is less than 2000 cubic meters, and (iv) crest length is smaller than 500 meters.

Under this new arrangement, in addition to the PCF project selection and portfolio criteria specified in the PCF Instrument, the PCF will give preference to subprojects where:

- Required licenses, concessions, permits, etc, have been obtained;
- Power Purchase Agreement (PPA) is in place and tariff has been approved by the General Comptroller's Office and ARESEP, and documentation to this effect is provided to the PCF by OCIC; and,
- Debt and/or equity finance for the underlying project will be in place such that financial closure can be attained by the time the PCF ERPA is negotiated.
- An Environmental Impact Assessment (EIA) has been prepared and approved by SETENA.

Due diligence and appraisal

A Project Concept Note (PCN) will be prepared for each new subproject, which will be submitted to the Fund Management Committee for approval, and subsequently to the PCF Participants Committee for clearance. Upon approval and clearance, funds will be authorized to undertake standard World Bank technical, economic, financial, legal and environmental/social due diligence on each new subproject. In addition, a Project Design Document, Baseline Study, and Monitoring & Verification Protocol will be prepared for each new subproject. Based on the results of the due diligence and the above PCF documents, the PCF Fund Manager may

recommend to the regional Task Team Leader the inclusion of a subproject in the Umbrella Project. The Task Team Leader will then send a memo to the Country Director, describing the new subproject and recommending its inclusion in the Umbrella. Once the Country Director approves and the subproject has been independently validated to meet all UNFCCC criteria, the subproject can be included in the Umbrella Project as an annex to the Project Appraisal Document.

D: Project Rationale

1. Basis for PCF project selection:

An umbrella project in Costa Rica fits well with the PCF portfolio strategy of achieving diversity across countries and regions and emphasizing renewable energy. The proposed project would be among the first PCF projects in Central America. Costa Rica has abundant renewable energy resources, especially for hydropower. Currently, only about 10% of the potential for hydropower is being used.

Based on an extensive market analysis of Costa Rica's renewable energy sector, it was decided to create an umbrella project for Costa Rica. The Umbrella Project provides the necessary framework for the approval of a number of subprojects, each of which would require undue administrative efforts when dealt with individually. The implementation of the Umbrella Project will support the PCF's goal of learning and dissemination of knowledge.

Additionality: The Umbrella Project intends to modify the carbon intensity of electric energy supply in Costa Rica through support for low or zero carbon power plants – and this modification is the source for the emission reductions. The revenue provided by the sales of ERs will create a supplementary incentive to invest in renewable energy.

The expansion planning and electricity dispatching in Costa Rica is done on the basis of a cost analysis. Accordingly, in order to determine the *additionality of each proposed Subproject*, the cost of generated power is calculated and compared with the marginal long-term production cost in the integrated power system. A proposed Subproject is considered additional if the kWh generation costs exceed the long-term marginal generation costs of the integrated power system, which is determined to be the national utility's long-term marginal cost of US$0.057, as given in the 2001-2016 National Expansion Plan.

For the three Sub-projects the generation cost is approximately twice as high as the LRMC (Chorotega US$ 0.116/kWh, Cote US$ 0.114/kWh, Vara Blanca US$ 0.125/kWh) and therefore, as per the established methodology and cost criterion, they are considered additional.

ICE expansion plan includes some projects to be developed by private investors to comply with provisions of Decree No. 7508. The costs of these projects are somewhat higher than other candidates and thus they would not be included in a pure least cost expansion plan. These plants increase slightly the LRMC and hence make the cost baseline figure more conservative, i.e. exclude more plants as non-additional. As such, plants in the expansion plan which have higher than LRMC cost should also be considered additional.

2. Major related projects financed by the Bank and/or other development agencies:
(completed, ongoing and planned)

Table 5:

Sector issue	Project	Latest Supervision (Form 590) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	**Development Objective (DO)**
BANK-FINANCED			
Environment	Ecomarkets	S	S
Environment	Biodiversity Resources Development	S	S
Environment	Certified Tradable Offsets	S	S
Transport	Transportation Sector Investment	S	S
Water Supply	Water Supply	S	S
OTHER DEVELOPMENT AGENCIES			

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

3. Lessons learned and reflected in the project design:

The proposed Umbrella Project is one of the first projects of the PCF portfolio that is implemented by both the private and the public sector. This public/private orientation is essential in the case of Costa Rica where power sector activities are in the hands of both the private and the public sector. The experience with a similar type of project that could be reflected in the project design is therefore very limited; nevertheless, the project has benefited from the coordination and consultations with parallel PCF projects that are being developed in Latin America (e.g. Chile, Brazil, Colombia, Nicaragua, Guatemala).

4. Indications of borrower commitment and ownership:

The Government of Costa Rica has shown foresight in developing products oriented towards international carbon markets in recent years, including the certified tradable offsets from land use management and forestry activities. The idea for the proposed project originated in requests from the Government to the World Bank to support the design, implementation, and financing of a program to market national and global environmental services. These requests were presented by the Vice President and Minister of MINAE, Elizabeth Odio, and members of the Rodriguez Administration during a visit with President Wolfensohn in April 1998. Letters from President Rodriguez to President Wolfensohn soliciting World Bank support for the associated Ecomarkets Project were delivered by the Government Delegation. A letter from the Minister of Finance to the World Bank expressing support for the PCF umbrella project was also presented.

5. Value added of Bank support in this project:

The PCF is a new product of the World Bank that aims to demonstrate how market-based emissions transactions can mitigate global climate change and pioneer emission reduction purchase transactions. The Bank's involvement was seen as critical in terms of ensuring quality of the first projects, as well as institutionalizing experiences and ensuring replicability of the projects, while providing necessary project due diligence and other fiduciary responsibilities.

The value-added of Bank support includes the availability of in-house environmental economics and natural resources management expertise, ability to mobilize global experts with long experience in the field, technical support for project preparation, supervision capacity, and development of linkages with other sources of expertise and funding. Finally, the Bank brings to the proposed project the ability to serve as a catalyst for promoting environmental services throughout Central America as well as knowledge of climate change mitigation programs both regionally and worldwide.

PCF support is warranted given that the project promotes the marketing of ERs in accordance with UNFCCC guidelines and the CDM framework as envisioned in the Kyoto Protocol. To increase the likelihood that the reductions will be recognized by the Parties to the UNFCCC, independent experts have validated the project design, baseline and MVP; and will also verify and certify for the resulting ERs that respond to UNFCCC rules as they develop. Likewise, the PCF is developing a knowledge base of business processes and practices to facilitate climate-friendly investment and inform the ongoing UNFCCC negotiations, as well as the public, of its lessons learned.

E: Summary Project Analysis:

1. Sector:

The PCF requires that supported projects demonstrate environmental additionality. A project is additional if the scenario "with the project" generates fewer greenhouse gas emissions than the baseline ("business as usual") scenario. Additionality depends on the LRMC of energy generation: Under the assumption that a least-cost approach is followed and that renewables are not the least cost option, there will be no investment in renewables unless there is some other incentive. This incentive could be a policy stating that renewables have to be included, or a payment to reduce the costs of renewables (PCF).

Business As Usual:
According to market studies performed during project preparation, capital costs for new hydroelectric plants in Costa Rica range from approximately $1,200/kW to $1,800/kW (subproject costs: $1,400-$2,600/kW); capital costs of other renewable energy technologies in Costa Rica are higher. With a 54% capacity factor, which is average for the existing systems, this gives an average production cost of $45/MWh based on public-sector financial terms, assuming 40-year amortization at 12% cost of capital.[1] With 15-year loan amortization, which is

[1] It is worth noting that such terms are increasingly difficult for the public sector to obtain for energy projects in the Central America region given that international financiers have reduced their available financing of public sector energy projects. As such, it is expected that private sector will play an increasing role in electricity generation in the region. The original calculations in project preparation report are based on a capacity factor of 60%, and the results are recalculated here under the assumption of a 54% capacity factor, which more closely relates to existing conditions in Costa Rica.

more typical for the private sector, this average cost increases to $52/MWh. With private-sector terms, namely 70% debt at 10% for 10 years and 30% equity with a 20% IRR, the required revenue for a plant with average capital cost would increase to $60/MWh, with a range of $55-65/MWh. The Baseline study estimates $57/MWh LRMC. The shift to private-sector financing can have a substantial impact on the competitiveness of renewable energy projects, given their higher initial capital costs and lower O&M expenditures. By comparison, thermal plant capital costs can be as low as $500/kW installed, somewhat lower than that of renewable energy projects.

In order to evaluate the issue of additionality, it is useful to review recent projects throughout the region and their pricing.[2] In 1998, Nicaragua's utility company awarded a 50 MW oil-fired project, and the winning price was a total blended rate (i.e., incorporating energy and capacity payments) of $57.5/MWh on a Build-Own-Operate (B-O-O) basis. In 1997, a 150 MW coal B-O-O project was awarded in Guatemala at a price of $52/MWh. The regional trend strongly favors relatively inexpensive fossil fuel-fired generation, given that they are competitive in terms of production costs; moreover, thermal plants can be developed more quickly than certain renewable energy plants (e.g., geothermal, small hydro) in the region and hence deliver energy to the national grid more quickly. In summary, it is expected that competitive bids for large thermal projects will drive the regional generation price to a level in the range of $52-58/MWh.

2. Financial:

The following financial analysis of the subprojects is a summary of the more detailed analysis included in Annex 1.

Cote Hydroelectric Subproject

The project will incur investment costs of approximately US$10.9 million. The cost estimate has been approved by an independent review. The sponsor (CNFL) will finance the project with 19% equity and 81% debt. The average purchase price for Cote's expected generation is $0.0792/kWh. Carbon financing is considered during the first 21 years of the subproject's life at a price of $3/tCO2e, using the ER computations from the baseline study.

Table 6: Cote Financial Analysis

Project NPV and FIRR	without carbon	with carbon
NPV 8%	360,255	619,493
NPV 9%	(1,130,822)	(890,163)
NPV 10%	(2,348,120)	(2,123,952)
NPV 11%	(3,351,661)	(3,142,181)
NPV WACC	801,950	1,066,400
FIRR	8.22%	8.39%
WACC	7.74%	7.74%

For the base case Cote Hydro Subproject shows a forecasted IRR of 8.22% without carbon

[2] It is worth noting that in Costa Rica, there have not been new thermal plants developed in recent years, but one can expect that the same economic conditions will apply.

financing. The rate goes up to 8.39% with carbon funds. Net Present Values (NPVs) are positive up to this rate. NPV at WACC (7.74%) is $801,950 with no carbon funds and $1,066,400 with carbon funds.

Two loans from BCIE will be taken at 7.76% and 5.67% interest respectively. Both are 10 years long with a one-and-a-half-years grace period.

CNFL is a sound company, financially. It has been posting profits at least for the past three fiscal years. Their liquidity, capitalization and profitability ratios are those of a healthy corporation (See Annex 1). Cote Hydro Project's impact on CNFL performance is likely to be small, since project investment will be 6% of CNFL's fixed assets, and projected revenues (or less peak power and energy bought from ICE), less than 1% of CNFL's revenues. CNFL's Forecasted Financial Statements for first year of Cote's operations are also shown in Annex 1.

Table 7: Cote Operational Ratios

Operational Ratios	
Capacity	6.3MW
Generation	13,169MWh
Plant Factor	23.86%
Investment	10,920,222US$
Inv/Cap	1,733$/kW
Inv/Gen	0.8292$/kWh/a

Chorotega Wind Power Subproject

The project will incur investment costs of approximately US$17.3 million (see assumptions for the base case vs. sensitivity analysis in Annex 1). O&M costs estimates have been checked by an independent review. The sponsor (ECSA) will finance the project with 25% equity and 75% debt. The average purchase price for Chorotega's expected generation is $0.090/kWh. Carbon financing is considered during the first 21 years of subproject's life at a price of $3/tCO2e, using the ER computations from the baseline study.

Table 8: Chorotega Financial Analysis

Project NPV and FIRR	without carbon	with carbon
NPV 8%	541,176	1,017,902
NPV 9%	(1,053,729)	(604,633)
NPV 10%	(2,429,587)	(2,005,388)
NPV 11%	(3,622,763)	(3,221,083)
NPV WACC	6,051,510	6,613,198
FIRR	8.32%	8.61%
WACC	5.41%	5.41%

For the base case Chorotega Wind Subproject shows a forecasted IRR of 8.32% without carbon

financing. The rate goes up to 8.65% with carbon funds. NPVs are positive up to this rate. NPV at WACC (5.41%) is $6,051,510 with no carbon funds and $6,613,198 with carbon funds. See Annex 1 for Cost of Capital computations.

Two loans will be taken. The first, from BCIE will have 6% interest and 8 years term on an amount of $5,870,842. The second one is a subsidized loan from Fortis, a Belgian bank that supports special renewable projects with Belgian technology. The interest on this loan is only 1%, which explains the low WACC. It is for 12 years and an amount of $7,188,000.

Table 9: Chorotega Operational Ratios

Operational Ratios	
Capacity	8.4MW
Generation	21,164 MWh/a
Plant Factor	28.76%
Investment	17,334,890US$
Inv/Cap	2,064US$/kW
Inv/Gen	0.82US$/kWh/a

Coopeguanacaste is financially sound. It posted profits during year 2000, their financial leverage is low, and has a healthy string of cash flows. Turbowinds, on the other hand, is not performing as well. The company has experienced difficulties in the years 1998 and 1999, accumulating losses of 115 million Belgian Francs. A slowdown in sales in 1998 (a bad year for the wind generation industry) and accelerating depreciation and write-offs schemes are the cause for this loss. Sales in 2000 increased dramatically, and Turbowinds saw black numbers again, although operating costs are substantially higher than in the past. Despite the sales bonanza and the end of large depreciation charges, Turbowinds short-term financial situation is critical, running a cash deficit and relying on inventories to finance their working capital.

Vara Blanca Wind Power Subproject

The project will incur investment costs of approximately US$20.3 million (see assumptions for the base case vs. sensitivity analysis in Annex 1). O&M costs estimates have been checked by an independent review. The sponsor (EVBC) will finance the project with 23% equity and 77% debt. The average purchase price for Vara Blanca's expected generation is $0.090/kWh. Carbon financing is considered during the first 21 years of subproject's life at a price of $3/tCO2e, using the ER computations from the baseline study.

Table 10: Vara Blanca Financial Analysis

Project NPV and FIRR	no PCF	with PCF
NPV 8%	(1,415,047)	(903,002)
NPV 9%	(3,164,082)	(2,682,202)
NPV 10%	(4,668,862)	(4,214,130)
NPV 11%	(5,970,389)	(5,540,178)
NPV WACC	6,325,528	6,957,846
FIRR	7.29%	7.55%
WACC	4.85%	4.85%

For the base case Vara Blanca Wind Subproject shows a forecasted IRR of 7.29% without carbon financing. The rate goes up to 7.55% with carbon funds. NPVs are positive up to this rate. NPV at WACC (4.85%) is $6,325,528 with no carbon funds and $6,957,846 with carbon funds. See Annex 1 for Cost of Capital computations.

Two loans will be taken. The first, from BCIE will have 6% interest and 8 years term on an amount of $5,118,549. The second one is a subsidized loan from Fortis, a Belgian bank that supports special renewable projects with Belgian technology. The interest on this loan is only 1%, which explains the low WACC. It is for 12 years and an amount of $10,440,307.

Table 11: Vara Blanca Operational Ratios

Operational Ratios	
Capacity	9.6MW
Generation	22,869MWh/a
Plant Factor	27.19%
Investment	20,368,023 US$
Inv/Cap	2,122$/kW
Inv/Gen	0.89$/kWh/a

Empresa de Servicios Publicos de Heredia is financially sound. It posted profits during year 2000, their financial leverage is low, and has a healthy string of cash flows. Turbowinds, on the other hand, is not performing as well. The company has experienced difficulties in the years 1998 and 1999, accumulating losses of 115 million Belgian Francs. A slowdown in sales in 1998 (a bad year for the wind generation industry) and accelerating depreciation and write-offs schemes are the cause for this loss. Sales in 2000 increased dramatically, and Turbowinds saw black numbers again, although operating costs are substantially higher than in the past. Despite the sales bonanza and the end of large depreciation charges, Turbowinds short-term financial situation is critical, running a cash deficit and relying on inventories to finance their working capital.

3. Technical

Cote Hydroelectric Subproject

The Cote Subproject is a 6.3 MW hydroelectric project which will take advantage of the infrastructure already installed to divert water from Cote Lake to the ICE Arenal Reservoir to produce electricity. In 1982, ICE constructed a dam on the Cote River (the natural drain from the lake) converting the lake into a regulation reservoir. The existing water intake structure, tunnel and dam will be used, although some modifications will be undertaken.

New structures include an open canal, another tunnel, a pressure pipe, a forebay, a powerhouse containing a 6.3 MW Francis turbine, a substation located next to the powerhouse and sluice leading to the Rugama Creek. The powerhouse and substation will occupy an area of 18.5 ha on land already highly altered from the Arenal Hydroelectric project. Water from the power house will be returned to the Rugama Creek for its ultimate discharge into the Arenal Reservoir.

This subproject has a number of unique characteristics that make the project particularly advantageous in economic, environmental, social and technical terms. Firstly, it will utilize the infrastructure constructed by ICE for the Arenal Hydroelectric project. Because water from the Cote Lake will be used, another reservoir does not need to be constructed. The project area already has very good road access for construction. Most of the land for the project was originally owned by ICE or has already been purchased from private owners. Construction of the new facilities will occur primarily on land that has already been altered by the Arenal Hydroelectric project, and little tree falling is required. The project will provide an average of 13.2 GWh per year to the interconnected grid, replacing approximately 85% of the equivalent in thermal energy used by ICE to cover peak hour and dry season demand. It is expected that the project will be operational in July 2002.

Chorotega Wind Power Subproject

The subproject consists principally of the construction of 14 wind driven generators of Turbowinds technology of 600 kW each, for a total of 8.4 MW, with annual generation estimated at 21.2 GWh. A 3 Km transmission line will deliver the energy to the Coopeguanacaste system through a substation at Santa Cruz. The location was chosen after careful consideration of the economic, geophysical, environmental and settlement characteristics of the area. The available wind data is of 2 years with a mean wind speed of 6 m/s. The land owners (Finca Chorotega) will transfer the land to the project and the area will be put under a forestall management program. The project infrastructure is small thus minimizing the environmental impact. During construction, minimum environmental impact is expected due to the small amount of infrastructure needed. There are no communities near the project site, since the project is located in a 300 ha property used for cattle grazing. The design of the turbines makes them almost soundless and environmentally friendly. Chorotega is expected to be operational in January 2003.

Vara Blanca Wind Power Subproject

The subproject includes the construction of 16 wind generators of Turbowinds technology of 600 kW each, for a total of 9.6 MW, generating around 22 GWh per annum. The project will sell energy to ICE. A transmission line will deliver the energy produced to a sub-station belonging to

ESPH. The project is expected to be operational in January 2003. The location of the VBES power generation facilities was chosen after careful consideration of the economic, geophysical, environmental and settlement characteristics of the area. There is enough information and wind measurements. The project infrastructure is small thus minimizing the environmental impact. During construction minimum environmental impact is expected due to the very little infrastructure needed. The principal land use in the project area is pasture. There are communities near the project site, but they won't be affected by the project structures; however the special design of the turbines and its blades, makes the project almost soundless and environmentally friendly.

4. Institutional

Cote Hydroelectric Subproject

CNFL is a state corporation, and the largest distributor of electricity in Costa Rica accounting for 46% of the electrical market in the country. Created in 1941, it mainly operates in San José Metropolitan Area where it services 383,000 clients. It is also the second largest generator in the country after ICE with 85MW of installed capacity in 8 hydroelectric plants. ICE owns 98.6% of the shares of CNFL since 1968. CNFL has a large professional staff skilled in all areas of project development, project financing, permitting, engineering, design and construction management, and plant operation and maintenance.

Chorotega Wind Power Subproject

The company that will develop the project is Eolica Chorotega S.A. (ECSA). Shareholders are:

- Cooperativa de Guanacaste R. L. (Coopeguanacaste) with 35% of shares.
- Turbowinds N.V. with 32.5% of shares.
- Finca Chorotega with 32.5% of shares.

Coopeguanacaste is the municipal cooperative that distributes energy to the Guanacaste area, serving 37,313 subscribers. It has a great record of innovation in clean energy, receiving the National Energy Award 2000 from MINAE for their leadership in solar electrification. Coopeguanacaste inteds to generate clean energy to serve the 12% increase in demand expected from the new wave of "ecotourism" business that the Guanacaste beaches and National Parks have created.

Turbowinds is a Belgian company that produces wind electricity generation equipment. They have installed more than 600 turbines in Europe, Australia, Asia, Africa and the US. It is owned by INVESTRECO, the Caterpillar distributor for the Benelux and in business since 1812. They will be also the equipment suppliers for the Chorotega project.

Finca Chorotega is the company that owned the farm where the project will be located. The owners exchanged the land for a stake in ECSA.

Vara Blanca Wind Power Subproject

The company that will develop the project is Electricidad Eolica Vara Blanca Belga Costarricense S.A. (EVBC). Shareholders are:

- Empresa de Servicios Publicos de Heredia (ESPH) with 51% of shares.
- Turbowinds N.V. with 49% of shares.

ESPH is the public municipal company that distributes energy and other utility services (mainly water and sanitary sewage) to Heredia province, serving 270,000 inhabitants. It has the legal form of a "Anonymous Society of the State" since 1998 keeping its public ownership but with a larger degree of autonomy. It is seeking to step into the exploitation of renewable resources and the waste management business. ESPH has a "Studies and Projects" Unit, specialized in business development of electricity generation assets.

Turbowinds is the same Belgian company that is involved in the Chorotega wind power project.

5. Social:

For the subprojects under consideration, social screening and assessment criteria have been built into the environmental assessment methodology outlined in Annex 6. These include: (i) required public consultation during the EA process as well as setting up mechanisms for public input in operation ; (ii) screening for projects which may cause resettlement (including water rights loss), and subsequent rejection under the Umbrella Project; and, (iii) screening for projects that may involve indigenous peoples, and may lead to subsequent rejection (if there are negative effects or projects affecting indigenous lands) or actions (in the case of affected populations).

A Sectoral Social Assessment was completed for the previous FRER project. Many of the findings and recommendations are applicable to the Umbrella Project as well. Of particular interest are the social concerns centering around hydropower development in Costa Rica. The fast increase in the number of hydropower plants (44 private hydropower plants currently in operation in Costa Rica and 143 renewable energy projects under preparation, 79 from ICE and 64 private, the vast majority of which are hydropower) has spurred a growing awareness of the environmental impacts of such projects, and a greater preoccupation with the quality of the environment, with local people's livelihoods, and with quality of life in general. Many civil society groups are calling for better flow of information regarding hydropower development plans for their region or river basin, and complain especially about the lack of information and more inclusive discussions regarding:

- The volume of water concessions awarded to such projects;
- The land which will be acquired by the projects;
- The sites in the basin where hydropower projects are being planned;
- The true impact of proposed and existing hydropower projects on in-stream flows;
- The findings and recommendations from the required EIAs, and information on the agency responsible for implementation of the environmental management plans. Although the legislation requires that SETENA carry out consultations on EIA findings with affected communities, these rarely happen; and,

- The true beneficiaries of such projects, since they usually are not seen as bringing substantial benefits to the local communities other than some temporary increase in employment opportunities during the construction phase.

To address these concerns, the Umbrella Project is requiring adherence to a public consultation procedure. Furthermore, none of the projects financed by the Umbrella Project are expected to threaten downstream water users' rights or cause involuntary resettlement. Environmental Impact Assessments (EIA) all subprojects proposed under the Umbrella Project. Such EIAs must meet Bank standards, including proper management of environmental and social issues. If appropriate, subproject MVPs will include indicators for socially sustainable development. It is envisaged that subproject performance against these indicators will be monitored by project operator and reported on by an independent third party as a part of the verification of the ERs produced.

For each subproject proposed under the Umbrella Project, project proponents/sponsors will be asked to provide information on land-tenure including, as applicable on agreements with land owners for land acquisition. The Environmental Management Plans (EMPs) produced as part of subproject preparation, will have to include, as appropriate, mitigatory or compensation measures identified and agreed to in the public consultations. Evidence of agreement with nearby or downstream stakeholders must be provided in order for the project to be considered. The ERPAs signed between the subproject sponsors and the PCF will include covenants on the satisfactory implementation of any social and environmental mitigation or compensation measures in the EMPs. Satisfactory implementation of any mitigatory measures will be monitored during supervision.

The social impact of an influx construction workers is considered in the EMP of each individual project

6. Environmental assessment: Environmental Category [ ] A [x] B [ ] C

The Umbrella Project is comprised of renewable energy subprojects that will generate ERs which satisfy the requirements of UNFCCC and the Kyoto Protocol. The project will not directly finance the construction of any renewable energy projects, but nevertheless a Sectoral Environmental Assessment (SEA) was carried out to examine the conditions under which these projects are currently built and operated in Costa Rica. The SEA concluded that the vast majority of existing renewable energy operations in Costa Rica are hydropower projects, mostly small and medium-sized run-of-river plants, with a very small number of wind and geothermal projects already built or in the pipeline. Until 1990, the majority of these projects were built and operated by ICE, but since then an increasing number of private projects have been built as a result of the approval of laws that opened the market for participation of the private sector to up to 30% of the country's total installed capacity.

In relation to the environmental issues associated with renewable energy subprojects in Costa Rica, particularly small hydropower, the SEA has determined that: (i) MINAE, and in particularly the National Environmental Technical Secretariat (SETENA) has had difficulty to evaluate and monitor the implementation of hydropower projects, due to inadequate staffing and technical and financial capacity to properly analyze the Environmental Impact Assessments (EIAs) submitted for such projects, and to carry out field supervisions of project implementation

after the license is given; (ii) there are currently no clear guidelines that could be used by private developers regarding the potential environmental impacts of such projects, especially small hydropower, both during construction and operation phases; and, (iii) the public consultation process in the context of preparation of EIAs is frequently not implemented nor enforced as established by Costa Rican EIA legislation.

The design, as well as the implementation plan for the PCF Umbrella Project, has taken into account the findings and recommendations of the SEA, as well as of the Sectoral Social Assessment (SSA) carried out during project preparation.

Whereas the environmental impacts of wind energy projects are expected to be minimal (e.g., utilizing existing access roads, transmission lines, intervened lands), to address some of the environmental issues potentially associated with any potential subprojects, especially run-of-river or small storage hydropower, the following determinations were agreed with OCIC:
(i) the project will not purchase ERs from renewable energy subprojects located within national parks nor biological reserves; (ii) the project will not purchase ERs from renewable energy subprojects located within an indigenous reserve or from any renewable energy subprojects that adversely affect indigenous communities or their territories; (iii) given the potential impacts and special design complexities of dams that are 10 meters or more in height, the project will not purchase ERs from hydropower projects of this size; and (iv) the project will not purchase ERs from small hydropower projects which are between 5-10 meters and have a reservoir volume of more than 3 million cubic meters. Considering that involuntary resettlement may cause severe long-term hardship, impoverishment, and environmental damage, any proposed project which involves involuntary resettlement as defined by World Bank Operational Policy 4.12, will not be considered.

The project will promote the mitigation of greenhouse gas emissions that contribute to global climate change through the development and international sale of high quality ERs. At the national level, the project will contribute to improved air quality by displacing development of new fossil-based energy systems, particularly diesel engines and heavy fuel oil plants, with environmentally sustainable renewable energy (e.g., wind energy, geothermal, landfill methane, biomass, run-of-river or small storage hydro). Renewable energy subprojects which participate in the project will be required to meet UNFCCC and PCF criteria which requires that all subprojects have positive, or at least not have negative, environmental externalities. Notwithstanding the positive benefits mentioned above, potential environmental risks of eligible subprojects include impacts on fish migration; interference with commercial whitewater rafting; flooding of river edge land; and impacts of construction of access roads.

The following questions have to be satisfactorily answered for subprojects to proceed:

What are the main features of the EMP and are they adequate?

Each subproject has developed an EMP, addressing all environmental and social issues that came out of the SEA, SA and EIA processes. The activities in the EMP include design recommendations, mitigation and prevention activities during construction and operation, and roles, responsibilities and budget for monitoring. The EMPs for the three subprojects are summarized in Annex 6.

Status of Environmental Impact Assessment?

The EIAs for hydropower must address the most pertinent issues as enumerated in the SEA, including impacts due to design, construction and operation: i) on river basin management, including impacts on hydrology, water rights, possible international water issues; ii) on aquatic vegetation; iii) on terrestrial ecosystems; and iv) cultural heritage. Further, the EIA should include: i) a vulnerability assessment (seismic and volcanic activity, landslides, soil liquification, earthquakes, etc.); ii) a description of public consultation and development of adequate compensation measures; and, iii) an Indigenous People's Development Plan, where appropriate.

Each individual subproject has undertaken an environmental assessment, following both national guidelines and the above-outlined Bank-specific framework. The EIAs were submitted both to SETENA in order to get the environmental license, and to the Bank. Both SETENA and the Bank reviewed the EIAs and EMPs and made recommendations for inclusion in the final version.

How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

Each project developed, in the context of the EMP, a proper monitoring scheme, with roles, responsibilities, budget and chronogram. SETENA assigns an environmental regent to each project, paid for by the project proponent. Their duty is to ensure that the EMP is being properly implemented. The Bank will receive copies of all the regent's reports for each subproject.

The subproject operators, through their agreement with the PCF, will have to monitor performance in accordance with the MVP, which will include key sustainable development indicators. The subproject performance, in particular ER generation, is verified annually by an independent third party (the "verifier"). In later stages of the project, these verifications may be done biannually. The third party monitoring which will be responsible for emissions reductions certifications will also be charged with monitoring the implementation of environmental and social activities.

In addition, the ERPAs signed between the subproject sponsors and the PCF will include covenants on the satisfactory implementation of any social and environmental mitigation or compensation measures in the EMPs. Satisfactory implementation of any mitigatory measures will be monitored during supervision.

The EIAs and EMPs for the three subprojects are summarized in Annex 6. The overall project has been discussed with the government (MINAE, ICE) and well as NGOs (Center for Tropical Studies, Grupo Yiski) and local stakeholder groups in each project area. The stakeholder consultations for each subproject are described in the EIA summaries (Annex 6).

7. Participatory Approach

During project preparation, a wide variety of consultations have been carried out with government offices (e.g., MINAE, FONAFIFO, SINAC, OCIC, SETENA, MINAE's Environmental Tribunal), public sector energy producers (e.g., CNFL, ICE), national and international non-governmental organizations (e.g., FUNDECOR, IUCN, INBio, *Red de Reservas Privadas*, *Centro Científico Tropical*, Organization for Tropical Studies, the University of Costa Rica's Center for the Investigation of Environmental Contamination, and the Asociación Preservacionista de Flora y Fauna Silvestre (APREFLOFAS)), private sector organizations (e.g., ACOPE, *Cámara Costarricense Forestal*), and local communities to discuss the potential purchase of emission reductions from renewable energy subprojects. Likewise, extensive consultations and stakeholder seminars were carried out during preparation of the associated Ecomarkets Project; it is noted that the Umbrella Project was one component of the Ecomarkets Project until shortly before project appraisal of the latter project.

8. Safeguard Policies

Policy		**Applicability**
	Environmental Assessment (OP 4.01)	Yes
	Natural Habitats (OP/BP/GP 4.04)	Yes
	Forestry (OP 4.36)	No
	Pest Management (OP 4.09)	No
	Cultural Property (OPN 11.03)	No
	Indigenous Peoples (OD 4.20)	No
	Involuntary Resettlement (OP 4.12)	No
	Safety of Dams (OP 4.37)	No
	Projects on International Waterways (OP 7.50)	No
	Projects in Disputed Areas (OP 7.60)	No

F: Sustainability and Risks

1. Sustainability:

The sustainability of the Umbrella Project depends on the availability of eligible subprojects which can produce ERs. Costa Rica has shown great interest in participation in the Umbrella Project and has a great potential for renewable energy generation. The regulatory and policy environment support the inclusion of renewable energy as well. The financial viability of the enterprises and the project sponsors of the subprojects will be ascertained individually. Sustainability requires among others that the Government ratifies and follows obligations under the UNFCCC and its protocols.

Costa Rica has significant experience in promoting innovative environmental programs, including the World Bank/GEF-financed Ecomarkets Project and World Bank/GEF-financed Biodiversity Resources Development Program. Furthermore, OCIC successfully implemented an IDF promoting climate change mitigation.

The eligible subprojects that generate ERs for sale and transfer to the PCF may continue to produce ERs for sale on the international carbon market beyond the life of the Umbrella Project. In addition, it is expected that other renewable energy projects in Costa Rica will generate ERs during the life of the PCF Umbrella Project and will benefit from the market access gained from implementation of this project. Likewise, OCIC's capacity to identify projects which generate ERs and disseminate knowledge gained from international carbon trading will be significantly increased through their collaboration with the PCF.

2. Critical Risks:

As Costa Rica ratified the Kyoto Protocol on February 11, 2002, there are no critical risks remaining that could negatively affect the implementation of the Umbrell project and the transfer of ERs to the PCF..

Subproject Level:

Concessions for Water Use. MINAE's rights to issue concessions have been contested in court recently when the Constitutional Tribunal rejected as invalid a decree that granted water rights to a private generator. This is an issue that is deterring implementation of some private power projects. However, a recent court decision granted MINAE the authority to issue water concessions to BOT-type projects under Law 7058.
PPA and Project Power/Energy production. The feasibility of the subprojects depends to a large degree on the price per kWh that ICE pays. It seems that ICE has recently been trying to renegotiate existing PPAs, which will add uncertainty for private investors. It is possible that doubts regarding the finality of such agreements prevent the investment community from committing funds. Another area of uncertainty is the required approval from ARESEP for the proposed tariffs.

Competition from Energy Imports. As mentioned above (section B.2), the existence of a regional market, SIEPAC for transmission and a large private power plant in Honduras could mean decreasing energy costs, which could create a problem if ICE is bound by long-term contracts

featuring higher rates.

Financial Risks. The financial risk for each of the subprojects under consideration can summarized as follows:

Cote Hydroelectric Project:

- Water Concession: CNFL's view is that Cote has the right to use extra water flows for its generation based on art. 5 of Law 7508. MINAE's opinion is that CNFL needs to re-apply for an extension of the existing water concession. MINAE is open to grant an extension if CNFL applies. Even though there is the risk that somebody could challenge those water rights, it is generally felt that this risk is low since there are no existing stakeholders that may have a claim to the water use. And MINAE political will is to provide the extension needed anyway.
- CNFL risk of default: this risk is remote, but it is worth mentioning it here. Since Cote cannot provide sufficient cash flow to service its own debt during the accelerated repayment period, CNFL will provide the extra cash needed.
- Standard project risks: political, technical performance or construction risks are not anticipated to be higher than the normal for this type of projects. Those risks will be even lower since CNFL is a public company.

It must be noted that PCF exposure is always limited since there are no advanced payments and ER purchases are due once generated. If the project fails for the reasons above, no PCF payments would have been made. Hence, PCF exposure would be restricted to only the transaction costs incurred until then.

Chorotega Wind Power Project

- PPA's approval by ARESEP at the requested tariff: Chorotega's income is contingent upon approval of proposed tariff of $0.090. Without this tariff's approval, the project may not be financially viable.
- Turbowinds's risk of default: Turbowinds liquidity problems may potentially pose a danger, if they cannot come up with its equity share of $970,000 or if they cannot survive as a supplier of equipment and parts.
- Standard project risks: political, technical performance or construction risks are not anticipated to be higher than the normal for this type of projects. Turbowinds turbines are known in the market, and ECSA has subscribed expensive insurance policies that guarantees generation for the first three years of the project's life.
- Short-term financing needs: Debt coverage needs external short-term financing or a higher initial investment. We suggest to change the debt structure to longer term loans (i.e. the second loan to go from 8 to 12 years).

It must be noted that PCF exposure is always limited since there are no advanced payments and ER purchases are due once generated. If the project fails for the reasons above, no PCF payments would have been made. Hence, PCF exposure would be restricted to only the transaction costs incurred until then.

Vara Blanca Wind Power Project

- PPA's approval by ARESEP at the requested tariff: Vara Blanca's income is contingent upon approval of proposed tariff of $0.090. Without this tariff's approval, the project may not be financially viable.
- Turbowinds's risk of default: Turbowinds liquidity problems may potentially pose a danger, if they cannot come up with its equity share of $404,000 or if they cannot survive as a supplier of equipment and parts. Taking into account that Turbowinds have to come up with previous equity financing for Chorotega Subproject, and the low IRR of this project we will like to express our concerns for the risky position of this project.
- Standard project risks: political, technical performance or construction risks are not anticipated to be higher than the normal for this type of projects. Turbowinds turbines are known in the market, and EVBC has subscribed expensive insurance policies that guarantees generation for the first three years of the project's life.
- Short-term financing needs: Debt coverage needs external short-term financing or a higher initial investment. We suggest to change the debt structure to longer term loans (i.e. the second loan to go from 8 to 12 years).

We must note that PCF exposure is always limited since there are no advanced payments and ER purchases are due once generated. If the project fails for the reasons above, no PCF payments would have been made. Hence, PCF exposure would be restricted to only the transaction costs incurred until then.

Apart from these issues, the overall preliminary risk assessment is considered low to moderate with respect to the PCF's area of exposure. Given that several RE projects in Costa Rica have already been developed, have received power purchase agreements through ICE and project financing, and have largely completed construction, risks regarding the subprojects are low to moderate. These include:

Construction risk:	low / medium
Operational risk:	low / medium
Technology risk:	low/medium
Country risk:	very low
Project entity / institutional risk:	medium/high
Financial risk:	medium/high

It is expected that the portfolio of subprojects will reflect technologies in the market, where the majority of renewable energy projects in Costa Rica are small run-of-river or small storage hydropower, wind energy, and geothermal projects. There is also a possibility of inclusion of some biomass energy projects in the portfolio of subprojects.

These technologies are all proven and thus are classified as low risk. The newer wind energy turbines are more efficient, but less proven and thus the medium risk assessment. Similarly, construction risk is considered low, except in those cases where run-of-river or small storage schemes may be in a difficult location for construction purposes. Finally, both small, run-of-river or small storage hydro and co-generation power systems are considered mature technologies with a low operational risk. A medium risk assessment is given in the case of wind

energy turbines (e.g., maintenance issues regarding wind turbines and replacement parts, although the operation of wind plants in itself is quite straightforward). Seismic activity may be a risk in the area that would need to be addressed by construction methods for the subprojects.

3. Possible Controversial Aspects:

The Umbrella Project itself is unlikely to be controversial. However, some of the subprojects may face controversy. For example, resistance to new hydropower projects in Costa Rica seems to be growing. Another controversial issue is the purchase of independently produced energy by ICE. The unionized workforce has in the past successfully limited ICE's capacity to do so.

G: Main Project Conditions

Conditions for Purchase of ERs from Renewable Energy Subprojects:

The main conditions are:

- Signed ERPA between the eligible renewable energy subproject and the PCF. This agreement will include: covenants on insurance, monitoring, verification, certification, compliance with safeguard polices, as well as payments for, and transfer of, ERs.

- For each project, a Letter of Approval by Costa Rica (signed by the body that has authority to represent Costa Rica for this purpose) confirming that Costa Rica endorses the project for the purpose of Article 12 of the UNFCCC/Kyoto Protocol, and that the project sponsor has ownership of CERs generated by the project. A model Letter of Approval will be attached to the HCA; and

- A legal opinion by Costa Rica's Attorney General (*Procuraduria General de la Republica*) confirming the validity of the above documents and the authority of the Costa Rican signatories to enter into and/or issue these documents.

- All permits and concessions as required by Costa Rican law.

H: Readiness for Implementation

[x] 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
[ ] 1. b) Not applicable.

[ ] 2. a) The procurement documents for the first year's activities are complete and ready for the start of project implementation.
[x] 2. b) Not applicable.

[x] 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
[ ] 4. The following items are lacking and are discussed under loan conditions (Section G):

- Host Country Agreement
- ERPAs for subprojects

- Letters of Approval

I: Compliance with Bank Policies

[X] 1. This project complies with all applicable Bank policies.

[ ] 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

Team Leaders: Guillermo Ruan/Eduardo Zolezzi
Sector Manager/Director: Danny Leipziger
PCF Fund Manager: Kenneth Newcombe
Country Manager/Director: Donna Dowsett-Coirolo

Annex 1: Financial Analysis

1. COTE HYDRO SUBPROJECT

1.a. SUBPROJECT SPONSOR

1.a.1. Institutional Analysis

CNFL, Compañía Nacional de Fuerza y Luz, is a state corporation, and the largest distributor of electricity in Costa Rica accounting for 46% of the electrical market in the country. Created in 1941, it mainly operates in San José Metropolitan Area where it services 383,000 clients. It is also the second largest generator in the country after ICE with 85MW of installed capacity in 8 hydroelectric plants. ICE owns 98.6% of the shares of CNFL since 1968.

CNFL has a large professional staff skilled in all areas of project development, project financing, permitting, engineering, design and construction management, and plant operation and maintenance.

1.a.2. Financial Analysis

CNFL is a sound company from a financial point of view. It has been posting profits at least for the past three fiscal years. Their liquidity, capitalization and profitability ratios are those of a healthy corporation (See Table A6). Cote hydro subproject's impact on CNFL performance is likely to be small, since subproject investment will be 6% of CNFL's fixed assets, and projected revenues (peak power and energy bought from ICE), less than 1% of CNFL's revenues. CNFL's Forecasted Financial Statements for first year of Cote's operations are also shown in Table A6.

1.b. SUBPROJECT FINANCIAL ANALYSIS

1.b.1. Assumptions

The project financial analysis involves a base case and a sensitivity analysis. Cote Hydro Subproject will provide peak energy and power for CNFL that otherwise would have to be purchased from ICE at high prices. The base case assumes that the subproject's income is the substitution cost from buying the production from ICE. Generation and tariff schemes have been provided and revised by the World Bank project team to verify the accuracy of the sponsor's projections. Average purchase price with last ARESEP tariffs from ICE, for Cote's expected generation is $0.0792 kWh.

Costs have been provided by the sponsor and reviewed by an independent study ordered by the World Bank. Both costs and income will increase at 2% rate.

The subproject financials are provided in US dollars since tariffs and PPAs are indexed to that currency in Costa Rica in order to hedge electricity prices against exchange rate and local inflation volatility.

Tax rate is zero since CNFL is a tax-exempt public company. Working Capital requirements are negligible due to the small size of the subproject within CNFL and the healthy cash flow that this corporation enjoys. Lifetime of the subproject is 40 years, and commission date of plant is year 2003.

Carbon financing is considered during the first 21 years of subproject's life at a $3 price and with the ER computations from the baseline study.
WACC assumes a 12% expected return on equity.

1.b.2. Investment and Capital Expenditures

Forecasted investment costs are $10,920,220. Independent cost study validated this amount. There are no further capital expenditures expected in the life of the subproject.

1.b.3. Costs and Margins

Table A offers a comparison on margins and prices for Cote Hydro Subproject. In this case, sales price is the substitution cost from buying from ICE. "Profitability Test" comes from Income Statement Proforma figures (Table A5), that takes into account depreciation and interest. Cote has positive operating margins (since investment accounts for the largest portion of the cost) but high interest payments from grace period makes the first year operate with a loss (which is absorbed by CNFL's Income Statement). Margins improve as interest decreases in the life of the subproject.

Table A also shows Long Run Marginal Cost computations for Additionality purposes. It assumes Capital Recovery Factor at 12%. Cote's figure is $0.1139, for 40 years lifetime.

"Marketability Test" indicates a more accurate explanation of Cote's costs and margins, taking into account a Capital Recovery Factor at WACC (7.74%). Cote's cost is then $0.0766 per unit of output, below the $0.0792 sales price, and therefore, its production is marketable.

1.b.4. FIRR and sensitivity analysis

Table A1 shows the above assumptions and the Project NPV and IRR analysis. For the base case Cote hydro subproject shows a forecasted IRR of 8.22% without carbon financing. The rate goes up to 8.39% with carbon funds. NPVs are positive up to this rate. NPV at WACC (7.74%) is $801,950 with no carbon funds and $1,066,400 with carbon funds.Cash flow projections are shown in Table A2.

Table A3 shows a sensitivity analysis always considering the two carbon financing scenarios. The cases considered are an increase/decrease in sales of 5%, a scenario with zero increases in electricity prices, a positive deviation in original investment of 15% and a negative deviation in original investment of 5%. None of these cases turns the NPV at WACC negative, therefore we consider Cote hydro project a sound investment.

Equity NPV and IRR analysis are also provided in Table A1. Equity IRRs are 10.53% and 10.89% without and with carbon funds respectively.

1.b.5. Project Financing

CNFL will finance Cote Hydro Subproject with 18.84% equity and 81.16% debt. Two loans from BCIE will be taken at 7.76% and 5.67% interest respectively. Both are 10 years long with a one-and-a-half-years grace period. Table A4 shows loan amortization tables. High interest payments from grace period make first years of Cote's operations less profitable (Table A5). Also the relatively short length of loans' terms makes the Debt Service Coverage Ratio be below

1 during the length of the loans. CNFL's strategy is to use most of Cote's cash flow to repay its debt as soon as possible and absorb any cash shortages from that subproject. After year 10 Cote will be fully contributing to CNFL's bottom line, but in the meantime, the company needs to service part of Cote's debt from other sources of cash flow. This cash shortage has been reflected in the DCF analysis as Working Capital requirements.

1.b.6. Risks

Financial risks are summarized as follows:

- Water Concession: CNFL thinks Cote has the right to use extra water flows for its generation based on art. 5 of Law 7508. MINAE's opinion is that CNFL needs to re-apply for an extension of the existing water concession. MINAE is open to grant an extension if CNFL applies. Even though there is the risk that somebody could challenge those water rights, we think this risk is low since there are no existing stakeholders that may have a claim to the water use. And MINAE political will is to provide the extension needed anyway.
- CNFL risk of default: we think that this risk is remote, but it is worth to be mentioned here since Cote cannot provide cash flow enough to service its own debt during the accelerated repayment period. CNFL will provide the extra cash needed.
- Standard project risks: political, technical performance or construction risks are not anticipated to be higher than the normal for this type of projects. We tend to think that those risks will be even lower since CNFL is a public company.

We must note that PCF exposure is always limited since there are no advanced payments and ER purchases are due once generated. If the project fails for the reasons above, no PCF payments would have been made. Hence, PCF exposure would be restricted to only the transaction costs incurred until then.

2. CHOROTEGA WIND SUBPROJECT

2.a. SUBPROJECT SPONSOR

2.a.1. Institutional Analysis

The company that will develop the project is Eolica Chorotega S.A. (ECSA). Shareholders are:

- Cooperativa de Guanacaste R. L. (Coopeguanacaste) with 35% of shares.
- Turbowinds N.V. with 32.5% of shares.
- Finca Chorotega with 32.5% of shares.

Coopeguanacaste is the municipal cooperative that distributes energy to Guanacaste area, serving 37,313 subscribers. It has a great record of innovation in clean energy, receiving the National Energy Award 2000 from MINAE for their leadership in solar electrification. They pursue to generate clean energy in their area to serve the 12% increase in demand expected from the new wave of "ecotourism" business that the Guanacaste beaches and National Parks has created.

Turbowinds is a Belgian company that produces wind electricity generation equipment. They have installed more than 600 turbines in Europe, Australia, Asia, Africa and the US. It is owned by INVESTRECO, the Caterpillar distributor for the Benelux and in business since 1812. They will be also the equipment suppliers for the Chorotega project.

Finca Chorotega is the company that owned the farm where the project will be located. The owners exchanged the land for a stake in ECSA.

2.a.2. Financial Analysis

Coopeguanacaste enjoys a good financial situation. It posted profits during year 2000, their financial leverage is low, and has a healthy string of cash flows.

Turbowinds, on the other hand, is not performing as well. In Table B6 we can see how the company has experienced difficulties in the years 1998 and 1999, accumulating losses of 115 million Belgian francs. A slowdown in sales in 1998 (bad year for the wind generation industry) and accelerating depreciation and write-offs schemes are to blame. Sales in 2000 ramped up dramatically, and Turbowinds saw black numbers again, although operating costs are substantially higher than in the past. Despite the sales bonanza and the end of large depreciation charges, Turbowinds short-term financial situation is critical, running a cash deficit and relying in inventories to finance their working capital.

2.b. SUBPROJECT FINANCIAL ANALYSIS

2.b.1. Assumptions

The subproject financial analysis involves a base case and a sensitivity analysis. Chorotega Wind Subproject will provide energy for Coopeguanacaste that otherwise has to be purchased from ICE at high prices. ECSA will provide a complete PPA with Coopeguanacaste once it has been approved by ARESEP. The tariff proposal to ARESEP, expects the sales price to be $0.090 kWh.

Costs have been provided by the project sponsor. Both costs and income will increase at 2% rate.
Subproject financials are provided in US dollars since tariffs and PPAs are indexed to that currency in Costa Rica in order to hedge electricity prices against exchange rate and local inflation volatility.
Tax rate is 30%. Working Capital requirements are valued at $50,000 and provided initially by the original investment. Lifetime of the subproject is 25 years, and commission date of plant is year 2003.
Carbon financing is considered during the first 21 years of Chorotega's life at a $3 price and with the ER computations from the baseline study.
WACC assumes a 12% expected return on equity.

2.b.2. Investment and Capital Expenditures

Forecasted investment costs are $17,334,890. Independent cost study validated this amount. There are no further capital expenditures expected in the life of the project. Land has been valued at market value of $700,000. Partners' contribution to capital includes land at a book value of $3,000,000 but no cash transaction was recorded. Book value is probably so high in order to lower capital requirements for loans. Therefore, we use a land value of $3,000,000 in the base case and will use market value in the sensitivity analysis for a total investment of $15,034,890.

2.b.3. Costs and Margins

Table B offers a comparison on margins and prices for Chorotega Wind Subproject. In this case,

sales price of $0.090 is the one presumably approved by ARESEP. "Profitability Test" comes from Income Statement Proforma figures (Table B5), and takes into account depreciation and interest. Chorotega has positive operating margins (since investment accounts for the largest portion of project's cost) but high interest payments and fast depreciation make the first three years operate with a loss. Margins improve as interest and depreciation decrease in the life of the project. ECSA chooses an accelerated depreciation scheme that substantially increases profits after the third year.

Table B also shows Long Run Marginal Cost computations for Additionality purposes. It assumes a Capital Recovery Factor at 12%. Chorotega's figure is $0.1156, for 20 years lifetime.

"Marketability Test" indicates a more accurate explanation of Chorotega's costs and margins, taking into account Capital Recovery Factor at WACC (5.41%). Chorotega's cost is then $0.0865 per unit of output, below the $0.090 sales price, and therefore, its production is marketable.

2.b.4. FIRR and sensitivity analysis

Table B1 shows the above assumptions and the Project NPV and IRR analysis. For the base case Chorotega Wind Subproject shows a forecasted IRR of 8.32% without carbon financing. The rate goes up to 8.61% with carbon funds. NPVs are positive up to this rate. NPV at WACC (5.41%) is $6,048,893 with no carbon funds and $6,613,198 with carbon funds.
Cash flow projections are shown in Table B2.

Table B3 shows a sensitivity analysis always considering the two carbon financing scenarios and the inclusion of the market value vs. the book value of land. The cases considered are an increase/decrease in sales of 5%, a scenario with zero increases in electricity prices, and a positive/negative deviation in original investment of 15%. None of these cases turns the NPV at WACC negative, therefore we consider Chorotega Wind Project a sound investment.

Equity NPV and IRR analysis are also provided in Table B1. Equity IRRs are 11.92% and 12.31% without and with carbon funds respectively.

2.b.5. Project Financing

ECSA will finance Chorotega Wind Subproject with 24.67% equity and 75.34% debt. Two loans will be taken. The first, from BCIE will have 6% interest and 8 years term on an amount of $5,870,842. The second one is a supersubsidized loan from Fortis, a Belgian bank that supports Belgian technology export activities. The interest on this loan is only 1%, which explains the low WACC. It is for 12 years and an amount of $7,188,000. Table B4 shows loan amortization tables. The relatively short length of loans' terms makes the Debt Service Coverage Ratio be close to or even less than 1 during the first eight years. Cash flow from operations cannot cover for all debt payments without external short-term financing needed. This generates Working Capital Requirements that are considered as outflows in the cash flow tables (Table B2 and B7). It is important to note that the short term financial situation significantly improves with the inclusion of carbon sales. But also in this case Chorotega will need external short-term financing to cover its debt payments. Once the first loan is paid off, DSCR improves. The strategy is to accelerate debt payments, to make the project very profitable as soon as possible. PCF does not consider Fortis's loan "concessional financing" since it comes from a foreign bank to its own national companies to help in their export activities.

2.b.6. Risks

Financial risks are summarized as follows:

- PPA's approval by ARESEP at the requested tariff: Chorotega's income is contingent upon approval of proposed tariff of $0.090. Without this tariff's approval, the project may not be financially viable.
- Turbowinds's risk of default: Turbowinds liquidity problems may potentially pose a danger, if they cannot come up with its equity share of $970,000 or if they cannot survive as a supplier of equipment and parts.
- Standard project risks: political, technical performance or construction risks are not anticipated to be higher than the normal for this type of projects. Turbowinds turbines are known in the market, and ECSA has subscribed expensive insurance policies that guarantees generation for the first three years of the project's life.
- Short-term financing needs: Debt coverage needs external short-term financing or a higher initial investment. We suggest to change the debt structure to longer term loans (i.e. the second loan to go from 8 to 12 years).

We must note that PCF exposure is always limited since there are no advanced payments and ER purchases are due once generated. If the project fails for the reasons above, no PCF payments would have been made. Hence, PCF exposure would be restricted to only the transaction costs incurred until then.

2.b.7. Pending issues

Some of the pending documents or issues that the project sponsor needs to address/submit are:

- ARESEP-approved PPA.
- SETENA-approved EIA.
- MINAE-approved Public Service Concession
- Coopeguanacaste 1999 Annual Report
- BCIE-approved financing plan

3. VARA BLANCA WIND SUBPROJECT

3.a. SUBPROJECT SPONSOR

3.a.1. Institutional Analysis

The company that will develop the project is Electricidad Eolica Vara Blanca Belga Costarricense S.A. (EVBC). Shareholders are:

- Empresa de Servicios Publicos de Heredia (ESPH) with 51% of shares.
- Turbowinds N.V. with 49% of shares.

ESPH is the public municipal company that distributes energy and other utility services (mainly water and sanitary sewage) to Heredia province, serving 270,000 inhabitants. It has the legal form of a "Anonymous Society of the State" since 1998 keeping its public ownership but with a larger degree of autonomy. It is seeking to step into the exploitation of renewable resources and the waste management business. ESPH has a "Studies and Projects" Unit, specialized in business development of electricity generation assets.

Turbowinds is a Belgian company that produces wind electricity generation equipment. They

have installed more than 600 turbines in Europe, Australia, Asia, Africa and the US. It is owned by INVESTRECO, the Caterpillar distributor for the Benelux and in business since 1812. They will be also the equipment suppliers for the Vara Blanca project.

3.a.2. Financial Analysis

ESPH enjoys a good financial situation. It posted profits during year 2000, their financial leverage is low, and has a healthy string of cash flows.

Turbowinds, on the other hand, is not performing as well. In Table C6 we can see how the company has experienced difficulties in the years 1998 and 1999, accumulating losses of 115 million Belgian francs. A slowdown in sales in 1998 (bad year for the wind generation industry) and accelerating depreciation and write-offs schemes are to blame. Sales in 2000 ramped up dramatically, and Turbowinds saw black numbers again, although operating costs are substantially higher than in the past. Despite the sales bonanza and the end of large depreciation charges, Turbowinds short-term financial situation is critical, running a cash deficit and relying in inventories to finance their working capital.

3.b. SUBPROJECT FINANCIAL ANALYSIS

3.b.1. Assumptions

The subproject financial analysis involves a base case and a sensitivity analysis. Vara Blanca Wind Subproject will provide energy for ESPH that otherwise has to be purchased from ICE at high prices. EVBC will provide a complete PPA with ESPH once it has been approved by ARESEP. The tariff proposal to ARESEP, expects the sales price to be $0.090 kWh.

Costs have been provided by the project sponsor. Both costs and income will increase at 2% rate.
Subproject financials are provided in US dollars since tariffs and PPAs are indexed to that currency in Costa Rica in order to hedge electricity prices against exchange rate and local inflation volatility.
Tax rate is 30%. Working Capital requirements are valued at $50,000 and provided initially by the original investment. Lifetime of the subproject is 25 years, and commission date of plant is year 2003.
Carbon financing is considered during the first 21 years of Vara Blanca's life at a $3 price and with the ER computations from the baseline study.
WACC assumes a 12% expected return on equity.

3.b.2. Investment and Capital Expenditures

Forecasted investment costs are $20,368,023. Independent cost study validated this amount. There are no further Capex expected in the life of the project. Land has been valued at market and book value of $4,000,000.

3.b.3. Costs and Margins

Table C offers a comparison on margins and prices for Vara Blanca Wind Subproject. In this case, sales price of $0.090 is the one presumably approved by ARESEP. "Profitability Test" comes from Income Statement Proforma figures (Table A5), and takes into account depreciation

and interest. Vara Blanca has positive operating margins (since investment accounts for the largest portion of project cost) from the first year of operation. Margins improve as interest and depreciation decrease in the life of the project. EVBC chooses an accelerated depreciation scheme that substantially increases profits after the third year.
Table C also shows Long Run Marginal Cost computations for Additionality purposes. It assumes a Capital Recovery Factor at 12%. Vara Blanca's figure is $0.1255, for 20 years lifetime.
"Marketability Test" indicates a more accurate explanation of Vara Blanca's costs and margins, taking into account Capital Recovery Factor at WACC (4.85%). Vara Blanca's cost is then $0.0870 per unit of output, below the $0.090 sales price, and therefore, its production is marketable.

3.b.4. FIRR and sensitivity analysis

Table C1 shows the above assumptions and the Project NPV and IRR analysis. For the base case Vara Blanca Wind Subproject shows a forecasted IRR of 7.29% without carbon financing. The rate goes up to 7.55% with carbon funds. NPVs are positive up to this rate. NPV at WACC (4.85%) is $6,325,528 with no carbon funds and $6,957,846 with carbon funds.

Cash flow projections are shown in Table C2.
Table C3 shows a sensitivity analysis always considering the two carbon financing scenarios. The cases considered are an increase/decrease in sales of 5%, a scenario with zero increases in electricity prices, and a positive/negative deviation in original investment of 15%. None of these cases turns the NPV at WACC negative, therefore we consider Vara Blanca Wind Project a sound investment.
Equity NPV and IRR analysis are also provided in Table C1. Equity IRRs are 10.41% and 10.75% without and with carbon funds respectively.

3.b.5. Project Financing

EVBC will finance Vara Blanca Wind Subproject with 23.61% equity and 76.39% debt. Two loans will be taken. The first, from BCIE will have 6% interest and 8 years term on an amount of $5,118,549. The second one is a supersubsidized loan from Fortis, a Belgian bank that supports Belgian technology export activities. The interest on this loan is only 1%, which explains the low WACC. It is for 12 years and an amount of $10,440,307. Table C4 shows loan amortization tables. The relatively short length of loans' terms makes the Debt Service Coverage Ratio be close to or even less than 1 during the first eight years. Cash flow from operations cannot cover for all debt payments without external short-term financing needed. This generates Working Capital Requirements that are considered as outflows in the cash flow tables (Table C2 and C7). It is important to note that the short term financial situation significantly improves with the inclusion of carbon sales. But also in this case Vara Blanca will need external short-term financing to cover its debt payments. Once the first loan is paid off, DSCR improves. The strategy is to accelerate debt payments, to make the project very profitable as soon as possible. PCF does not consider Fortis's loan "concessional financing" since it comes from a foreign bank to its own national companies to help in their export activities.

3.b.6. Risks

Financial risks are summarized as follows:

- PPA's approval by ARESEP at the requested tariff: Vara Blanca's income is contingent

upon approval of proposed tariff of $0.090. Without this tariff's approval, the project may not be financially viable.

- Turbowinds's risk of default: Turbowinds liquidity problems may potentially pose a danger, if they cannot come up with its equity share of $404,000 or if they cannot survive as a supplier of equipment and parts. Taking into account that Turbowinds have to come up with previous equity financing for Chorotega Subproject, and the low IRR of this project we will like to express our concerns for the risky position of this project.
- Standard project risks: political, technical performance or construction risks are not anticipated to be higher than the normal for this type of projects. Turbowinds turbines are known in the market, and EVBC has subscribed expensive insurance policies that guarantees generation for the first three years of the project's life.
- Short-term financing needs: Debt coverage needs external short-term financing or a higher initial investment. We suggest to change the debt structure to longer term loans (i.e. the second loan to go from 8 to 12 years).

We must note that PCF exposure is always limited since there are no advanced payments and ER purchases are due once generated. If the project fails for the reasons above, no PCF payments would have been made. Hence, PCF exposure would be restricted to only the transaction costs incurred until then.

3.b.7. Pending issues

Some of the pending documents or issues that the project sponsor needs to address/submit are:

- ARESEP-approved PPA.
- SETENA-approved EIA.
- MINAE-approved Public Service Concession
- BCIE-approved financing plan

LIST OF TABLES

Table 1: Overview of Financials and Ratios

Without Carbon Financing

	NPV 8%	NPV 9%	NPV 10%	NPV 11%	NPV WACC	FIRR	WACC
COTE	360,255	(1,130,822)	(2,348,120)	(3,351,661)	801,950	8.22%	7.74%
CHOROTEGA	543,551	(1,051,440)	(2,427,380)	(3,620,635)	6,051,510	8.32%	5.41%
VARA BLANCA	(1,415,047)	(3,164,082)	(4,668,862)	(5,970,389)	6,325,528	7.29%	4.85%

With Carbon Financing

	NPV 8%	NPV 9%	NPV 10%	NPV 11%	NPV WACC	FIRR	WACC
COTE	619,493	(890,163)	(2,123,952)	(3,142,181)	1,066,400	8.39%	7.74%
CHOROTEGA	1,017,902	(604,633)	(2,005,388)	(3,221,083)	6,613,198	8.61%	5.41%
VARA BLANCA	(903,002)	(2,682,202)	(4,214,130)	(5,540,178)	6,957,846	7.55%	4.85%

Operational Ratios

	Capacity	Generation	Plant Factor	Investment	Inv/Cap	Inv/Gen
COTE	6.3	13,169,000	23.86%	10,920,222	1,733	0.8292
CHOROTEGA	8.4	21,164,000	28.76%	17,334,890	2,064	0.8191
VARA BLANCA	9.6	22,869,000	27.19%	20,368,023	2,122	0.8906

Financial Ratios

	Debt to Equity			DSCR			ROE		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
COTE	4.28	3.80	3.33	N/A	N/A	N/A	-0.49%	3.62%	7.75%
CHOROTEGA	2.78	2.49	2.19	0.96	0.98	1.00	-1.97%	-0.31%	0.99%
VARA BLANCA	2.95	2.65	2.35	0.92	0.93	0.94	0.69%	1.72%	2.79%

Table 2: Margin Comparison

Profitability Test								
	2003	2004	2005	2006	2007	2008	2009	2010
COTE								
Ave Price Sold	0.0792	0.0807	0.0824	0.0840	0.0857	0.0874	0.0891	0.0909
Total Cost + Int +Tax	0.0799	0.0751	0.0702	0.0654	0.0606	0.0489	0.0515	0.0466
Profit/(Loss)	(0.0008)	0.0057	0.0121	0.0186	0.0251	0.0385	0.0377	0.0443
CHOROTEGA								
Tariff Price	0.0900	0.0918	0.0936	0.0955	0.0974	0.0994	0.1014	0.1034
Total Cost + Int +Tax	0.0965	0.0949	0.0942	0.0728	0.0721	0.0658	0.0648	0.0637
Profit/(Loss)	(0.0065)	(0.0031)	(0.0006)	0.0227	0.0253	0.0336	0.0366	0.0397
VARA BLANCA								
Tariff Price	0.0918	0.0936	0.0955	0.0974	0.0994	0.1014	0.1034	0.1054
Total Cost + Int +Tax	0.0882	0.0878	0.0727	0.0723	0.0658	0.0650	0.0642	0.0632
Profit/(Loss)	0.0036	0.0059	0.0228	0.0252	0.0336	0.0363	0.0392	0.0422

	Additionality Test		**Marketability Test**	
	Cost	Margin	Cost	Margin
COTE	0.1139	(0.0347)	0.0766	0.0026
CHOROTEGA	0.1156	(0.0256)	0.0865	0.0035
VARA BLANCA	0.1255	(0.0355)	0.0870	0.0030

COTE HYDRO SUBPROJECT

Table A: Financial Overview

Project NPV and FIRR	no PCF	with PCF
NPV 8%	360,255	619,493
NPV 9%	(1,130,822)	(890,163)
NPV 10%	(2,348,120)	(2,123,952)
NPV 11%	(3,351,661)	(3,142,181)
NPV WACC	801,950	1,066,400
FIRR	8.22%	8.39%
WACC	7.74%	7.74%

Operational Ratios	
Capacity	6.3
Generation	13,169,000
Plant Factor	23.86%
Investment	10,920,222
Inv/Cap	1,733
Inv/Gen	0.8292

Financial Ratios	2003	2004	2005
Debt to Equity	4.28	3.80	3.33
ROE	-0.49%	3.62%	7.75%

Additionality Test	
Cost	Margin
0.1139	(0.0347)

Marketability Test	
Cost	Margin
0.0766	0.0026

Profitability Test	2003	2004	2005	2006	2007	2008	2009	2010
Ave Price Sold	0.0792	0.0807	0.0824	0.0840	0.0857	0.0874	0.0891	0.0909
Total Cost + Int +Tax	0.0799	0.0751	0.0702	0.0654	0.0606	0.0489	0.0515	0.0466
Profit/(Loss)	(0.0008)	0.0057	0.0121	0.0186	0.0251	0.0385	0.0377	0.0443

CHOROTEGA WIND SUBPROJECT

Table B: Financial Overview

Project NPV and FIRR	no PCF	with PCF
NPV 8%	543,551	1,017,902
NPV 9%	(1,051,440)	(604,633)
NPV 10%	(2,427,380)	(2,005,388)
NPV 11%	(3,620,635)	(3,221,083)
NPV WACC	6,051,510	6,613,198
FIRR	8.32%	8.32%
WACC	5.41%	5.41%

Operational Ratios	
Capacity	8.4
Generation	21,164,000
Plant Factor	28.76%
Investment	17,334,890
Inv/Cap	2,064
Inv/Gen	0.82

Financial Ratios	2003	2004	2005
Debt to Equity	2.78	2.49	2.19
ROE	-1.97%	-0.31%	0.99%
DSCR	0.96	0.98	1.00

Additionality Test	
Cost	Margin
0.1156	(0.0256)

Marketability Test	
Cost	Margin
0.0865	0.0035

Profitability Test	2003	2004	2005	2006	2007	2008	2009	2010
Ave Price Sold	0.0900	0.0918	0.0936	0.0955	0.0974	0.0994	0.1014	0.1034
Total Cost + Int +Tax	0.0965	0.0949	0.0942	0.0728	0.0721	0.0658	0.0648	0.0637
Profit/(Loss)	(0.0065)	(0.0031)	(0.0006)	0.0227	0.0253	0.0336	0.0366	0.0397

VARA BLANCA WIND SUBPROJECT

Table C: Financial Overview

Project NPV and FIRR	no PCF	with PCF
NPV 8%	(1,415,047)	(903,002)
NPV 9%	(3,164,082)	(2,682,202)
NPV 10%	(4,668,862)	(4,214,130)
NPV 11%	(5,970,389)	(5,540,178)
NPV WACC	6,325,528	6,957,846
FIRR	7.29%	7.55%
WACC	4.85%	4.85%

Operational Ratios	
Capacity	9.6
Generation	22,869,000
Plant Factor	27.19%
Investment	20,368,023
Inv/Cap	2,122
Inv/Gen	0.89

Financial Ratios	2003	2004	2005
Debt to Equity	2.95	2.65	2.35
ROE	0.69%	1.72%	2.79%
DSCR	0.92	0.93	0.94

Additionality Test	
Cost	Margin
0.1255	(0.0355)

Marketability Test	
Cost	Margin
0.0870	0.0030

Profitability Test	2003	2004	2005	2006	2007	2008	2009	2010
Ave Price Sold	0.0900	0.0918	0.0936	0.0955	0.0974	0.0994	0.1014	0.1034
Total Cost + Int +Tax	0.0886	0.0882	0.0878	0.0727	0.0723	0.0658	0.0650	0.0642
Profit/(Loss)	0.0014	0.0036	0.0059	0.0228	0.0252	0.0336	0.0363	0.0392

Annex 2: Project Processing Schedule

Taken to prepare the project (months)		
First Bank mission (identification)		
Appraisal mission departure	**12 November 01**	
PCF Negotiations	**April02**	
Signing	**May 02**	

Prepared by:

Guillermo Ruan and Eduardo Zolezzi

Preparation Assistance:

Bank staff who worked on the project include:

Name	Specialty
Guillermo Ruan	**Task Manager**
Eduardo Zolezzi	**Co-Task Manager, Sr. Power Engineer**
Kirsten Oleson	**Environmental Specialist/Operations Analyst (Environmental issues)**
Juan David Quintero	**Environmental Specialist**
Frank Baumgardt	**Consultant**
Francisco Fernández-Asin	**Consultant**
Stephanie Sheldon	**Team Assistant**
PCF Team:	
Ken Newcombe	**Sr. Advisor**
Jari Väyrynen	**Operations Analyst**
Odil Tunali-Payton	**Environmental Specialist**

Annex 3: Documents in the Project File

Documents in Project File additional to PAD annexes:

1. PCF Project Idea Notes for each subproject (prepared by OCIC and subproject sponsors)
2. PCF Project Concept Notes for each subproject (prepared by PCF)
3. Letters of Endorsement for subprojects
4. Costa Rica: Country Assistance Strategy
5. Sectoral Environmental Assessment
6. Subproject Environmental Impact Assessments
7. Financial documents for subprojects
8. Draft PCF Project Design Document
9. Baseline Study and Emissions Reductions Calculations
10. Chorotega Windfarm Subproject Baseline Study
11. Chorotega Windfarm Subproject Monitoring and Verification Plan (MVP)
12. Cote Hydropower Subproject Baseline Study
13. Cote Hydropower Subproject Monitoring and Verification Plan (MVP)
14. Vara BlancaWindfarm Subproject Baseline Study
15. Vara BlancaWindfarm Subproject Monitoring and Verification Plan (MVP)
16. Cost Rica Umbrella Project Final Validation Report
17. Draft Emission Reduction Purchase Agreement (Cote)

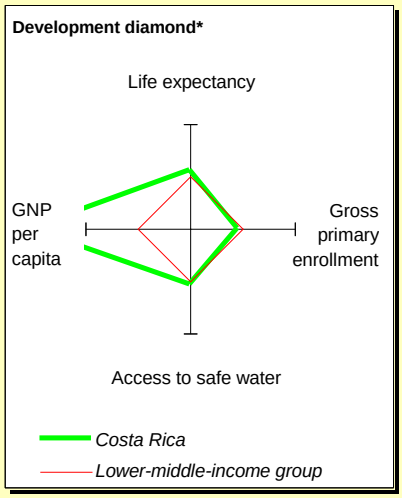
Annex 4: Statement of Loans and Credits

			Original Amount in US$ Millions						Difference between expected and actual disbursements[a]	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undis.	Orig	Frm Rev'd
P006938	1992	CR/BASIC EDUCATION	23.00	0.00						
P006954	1994	CR/HEALTH SECTOR REFORM	22.00	0.00						
P006926	1990	TRNSPRT SCTR INV	60.00	0.00						
P006941	1993	WATER SUPPLY	26.00	0.00						

No IFC Portfolio available

Annex 5: Country at a Glance

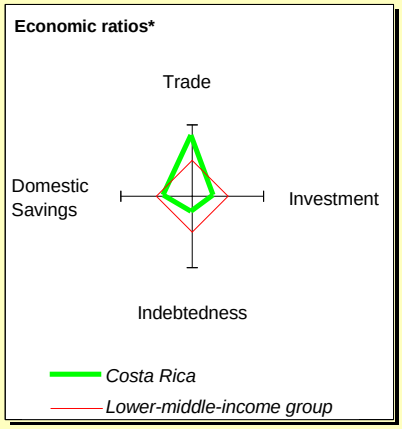
POVERTY and SOCIAL	Costa Rica	Latin America & Carib.	Lower-middle-income
1999			
Population, mid-year *(millions)*	3.6	509	2,094
GNP per capita *(Atlas method, US$)*	3,670	3,840	1,200
GNP *(Atlas method, US$ billions)*	13.2	1,955	2,513
Average annual growth, 1993-99			
Population *(%)*	1.9	1.6	1.1
Labor force *(%)*	2.3	2.5	1.2
Most recent estimate (latest year available, 1993-99)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	48	75	43
Life expectancy at birth *(years)*	77	70	69
Infant mortality *(per 1,000 live births)*	13	31	33
Child malnutrition *(% of children under 5)*	5	8	15
Access to improved water source *(% of population)*	92	75	86
Illiteracy *(% of population age 15+)*	5	12	16
Gross primary enrollment *(% of school-age population)*	104	113	114
Male	104	..	114
Female	103	..	116



KEY ECONOMIC RATIOS and LONG-TERM TRENDS

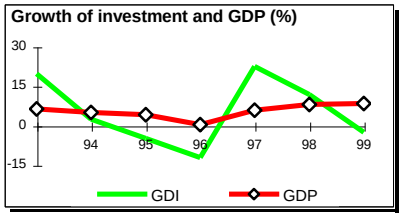
	1979	1989	1998	1999
GDP *(US$ billions)*	5.1	6.6	13.9	15.0
Gross domestic investment/GDP	25.3	26.5	20.5	16.6
Exports of goods and services/GDP	26.9	35.2	48.0	53.9
Gross domestic savings/GDP	15.0	22.6	17.6	23.1
Gross national savings/GDP	12.4	17.1	15.2	13.8
Current account balance/GDP	-10.9	-8.6	-5.3	-3.1
Interest payments/GDP	2.3	2.0	1.3	1.3
Total debt/GDP	41.7	69.5	28.6	27.9
Total debt service/exports	34.9	17.7	7.9	6.2
Present value of debt/GDP	..	..	27.3	..
Present value of debt/exports	..	..	54.7	..

	1979-89	1989-99	1998	1999	1999-03
(average annual growth)					
GDP	2.3	5.0	8.0	8.4	5.2
GNP per capita	-0.7	2.7	4.6	-1.6	3.7
Exports of goods and services	4.7	10.4	26.4	17.0	6.4

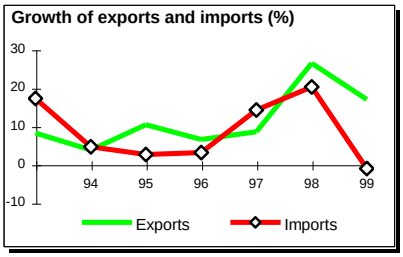


STRUCTURE of the ECONOMY

	1979	1989	1998	1999
(% of GDP)				
Agriculture	21.1	19.6	12.7	12.5
Industry	30.1	30.6	30.6	30.7
Manufacturing	20.8	23.2	23.5	23.6
Services	48.8	49.8	56.7	56.8
Private consumption	66.9	60.5	69.3	64.0
General government consumption	18.1	17.0	13.2	12.9
Imports of goods and services	37.2	39.1	50.9	47.4



	1979-89	1989-99	1998	1999
(average annual growth)				
Agriculture	2.7	4.2	6.0	3.6
Industry	2.0	5.7	11.3	21.1
Manufacturing	2.4	6.1	11.0	24.7
Services	2.5	5.4	6.7	3.1
Private consumption	4.7	4.5	5.5	-0.1
General government consumption	0.5	1.8	3.1	1.0
Gross domestic investment	-8.2	8.3	11.8	-2.6
Imports of goods and services	3.8	9.0	20.2	-1.0
Gross national product	2.1	4.8	6.4	0.1

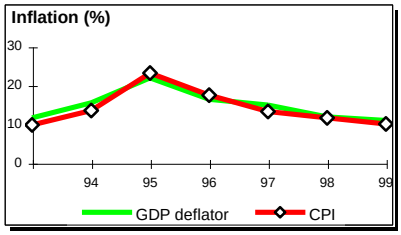


Note: 1999 data are preliminary estimates.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

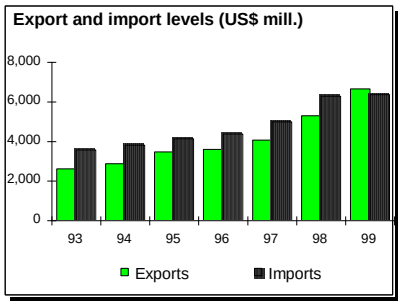
PRICES and GOVERNMENT FINANCE

	1979	1989	1998	1999
Domestic prices				
(% change)				
Consumer prices, average	9.2	16.5	11.7	10.0
Implicit GDP deflator	9.1	15.2	11.9	11.0
Central Government finance				
(% of GDP, includes current grants)				
Current revenue	..	..	12.9	12.6
Current budget balance	..	..	-1.1	-1.4
Overall surplus/deficit	..	..	-2.5	-2.8



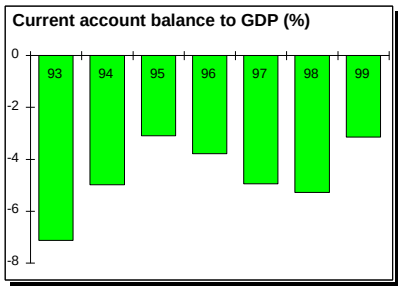
TRADE

	1979	1989	1998	1999
(US$ millions)				
Total exports (fob)	942	1,333	5,303	6,665
Coffee	..	286	410	289
Bananas	..	284	668	629
Manufactures	..	474	3,378	5,113
Total imports (cif)	..	1,650	6,280	6,362
Food	..	266	743	771
Fuel and energy	..	165	261	320
Capital goods	..	358	1,200	1,131
Export price index *(1995=100)*	..	..	99	95
Import price index *(1995=100)*	..	..	104	105
Terms of trade *(1995=100)*	..	..	96	90



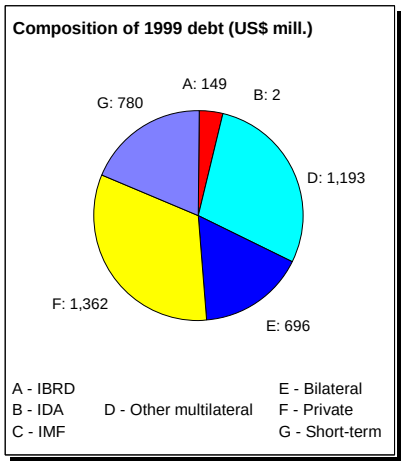
BALANCE of PAYMENTS

	1979	1989	1998	1999
(US$ millions)				
Exports of goods and services	1,098	1,841	6,648	8,181
Imports of goods and services	1,519	2,047	7,049	7,193
Resource balance	-421	-206	-401	988
Net income	-150	-402	-445	-1,569
Net current transfers	17	39	113	110
Current account balance	-554	-568	-733	-472
Financing items (net)	471	584	584	952
Changes in net reserves	83	-15	149	-480
Memo:				
Reserves including gold *(US$ millions)*	121	358	763	1,243
Conversion rate *(DEC, local/US$)*	8.6	81.1	257.2	286.8



EXTERNAL DEBT and RESOURCE FLOWS

	1979	1989	1998	1999
(US$ millions)				
Total debt outstanding and disbursed	2,115	4,589	3,971	4,182
IBRD	156	415	172	149
IDA	5	4	2	2
Total debt service	388	345	546	528
IBRD	20	67	52	47
IDA	0	0	0	0
Composition of net resource flows				
Official grants	1	139	25	21
Official creditors	101	9	-29	-117
Private creditors	98	-26	241	277
Foreign direct investment	44	101	559	585
Portfolio equity	0	0	25	0
World Bank program				
Commitments	34	0	0	0
Disbursements	21	43	20	12
Principal repayments	6	34	41	34
Net flows	15	9	-21	-23
Interest payments	14	33	12	13
Net transfers	0	-24	-33	-36



Annex 6: Environmental Issues, Criteria and Procedures

Summary of EIA report - Proyecto Eolico Vara Blanca

Name of the project:	Proyecto Eolico Vara Blanca
Location (map attached):	Poasito, Heredia
Energy technology (wind/hydro):	Wind
(Additional) power installed in the project:	9.6 MW
Likely date of commissioning of the project:	2003

Compliance with SETENA/MINAE

EIA report approval by SETENA (status and date):	Not yet complete
Water rights approval by MINAE/Water (status and date):	Not applicable

Existing environmental and social conditions (1 page max):

Geology. The area around the project is volcanic. Erosion is a problem on the hillsides with a slope greater than 39%.

Climate. The zone is classified as a very humid low rainforest, receiving an average 3200 mm of rain a year. Strong, constant easterly winds cross the area.

Natural Disasters. The project is located near Poas volcano, and thus undertook a study on seismic and volcanic activity that could affect the project. Seismic activity, active faults, threat of landslides, flooding and recent volcanic eruptions were studied and will be included in project siting and design.

Land Use. The area of influence of the project (approximately 10 hectares) is used for cattle farming. Other zones in the area are used for agricultural production.

Terrestrial Flora and Fauna. The surrounding area is characterized by secondary humid low montane forest. Many mammals, birds, amphibians and reptiles are present. The area of influence of the project is strictly pastureland, and no trees will be cut for the project. Since the area is used for cattle, terrestrial fauna is scarce.

Local Communities. The towns of Poasito and Vara Blanca are directly affected by the project. The main economic activities in the region are agriculture and tourism. The landowner where the windfarm will be located will lease the land to the project.

Cultural Property. Preliminary analyses indicate that no archeological sites exist in the area of construction.

Compliance with World Bank Safeguard Policies

Safeguard Policy	Is Policy triggered? Y/N	Main Environmental/Social Issues
Environmental Assessment (OP 4.01)	Yes	Construction impacts Impacts on birds
Forestry (OP 4.36)	No	
Involuntary Resettlement (OD 4.30)	No	
Indigenous Peoples (OD 4.20)	No	
Safety of Dams (OP 4.37	No	
Pest Management (OP 4.09	No	
Cultural Property (OPN 11.03	No	
Natural Habitats (OP 4.04	No	
Projects in Disputed Areas (OP 7.60	No	
International Waterways (OP 7.50	No	

Potential environmental and social impacts of the project without safeguards:

Environmental	Magnitude (High, Medium, Low)	Comments
Construction Impacts		
Increased erosion	Low	Caused by improper siting of access roads, transmission lines, other civil works
Loss of natural vegetative cover	Low	Caused by improper siting of access roads, transmission lines, other civil works
Soil contamination due to oil and fuel spills	Medium	Due to spillage
Water contamination	Medium	From improper disposal of wastes
Generation of debris	Medium	Debris generated during excavation
Dust and noise emission	Low	
Generation of domestic wastes	Low	
Esthetic Impacts		
Deterioration of landscape beauty	Medium	From towers
Operational Impacts		
Noise	Low	From towers
Bird kills	Low	From towers
Social		
Social Issues		
Interaction of the project personnel with the community	Medium	
Demand of goods and services	High	
Hiring of manual labor	Low	
Deterioration of roads	Low	
Traffic congestion	Low	
Purchase of properties	High	
Chance finds (archeological sites)	Low	

Alternatives examined and rationale for selecting this project (1 page max):

Costa Rica's energy expansion plan includes provision for 30% renewable energy. The country is expanding its portfolio of renewables, including hydropower, wind power and geo-thermal power. Wind energy is a truly clean source of electricity, and will substitute thermally-generated power. In certain regions of Costa Rica, climatic conditions are appropriate for development of wind power.

Technical alternatives considered included different turbines. Turbines were chosen with low noise emissions and no impact on birds.

Public consultation:

The project held several meetings with the community association and one meeting with the community of Vara Blanca. One member of the community association went to Belgium to assess the noise and safety issues of the turbines. Main concerns from the community were on noise and safety of the turbines, which are considered in the project design. An MOU with community has been signed on some mitigation measures for perceived impacts, including use of local labor, improvement and repair of roads, proper scheduling of transport and construction of a tourist attraction (a museum about wind energy).

Reference to the Environmental Management Plan:

Program/Activity	**Responsibility**	**Timing/Schedule**
Design	**Electricidad Eolica Vara Blanca Belga Costarricense, SA**	**Design**
Siting appropriate given seismic, volcanic and erosion considerations		
Technology chosen which is bird-friendly and emits little noise		
Construction Monitoring Plan	**Contractor**	**Regular monitoring during construction**
Limitation of tower base to 25 m2		
Proper siting of towers, ? km of access roads, civil works		
22 km of transmission line to parallel existing road		
Revegetation of any denuded areas		
Waste management		
Worker training/education		
Installation of temporary worker camp		

Repair and improvement of approx. 20 km of roads to allow passing of heavy equipment and towers		
Chance Finds	**EEVBBC, SA**	**During construction**
Archeologist on-site during excavation, on call for construction phase		
Land Acquisition	EEVBBC, SA	**Prior to construction**
All landowners adequately compensated		
Community Relations	Contractor/EEVBBC, SA	**Regular follow-up during design, construction and operation stage**
Use of local labor, where possible	Contractor	
Proper scheduling of transport of towers to avoid conflict with tourists	Contractor	
Building of small museum on wind power	EEVBBC, SA	

Summary of EIA report - Proyecto Eolico Chorotega

Name of the project:	Proyecto Eolico Chorotega
Location (map attached):	Finca Chorotega, Santa Cruz, Guanacaste
Energy technology (wind/hydro):	Wind
(Additional) power installed in the project:	6.6 MW
Likely date of commissioning of the project:	2003

Compliance with SETENA/MINAE

EIA report approval by SETENA (status and date):	Under review
Water rights approval by MINAE/Water (status and date):	N/A

Existing environmental and social conditions (1 page max):

Geology. The area around the project is alluvial.

Climate. The zone is classified as a pre-mountainous forest, receiving less than 2000 mm of rain a year. Strong, constant north-easterly winds cross the area, reaching 14 km/h in December.

Natural Disasters. Seismic activity, active faults, threat of landslides, flooding and recent volcanic eruptions were studied. Volcanic eruptions are not evident in the Nicoya peninsula. Seismic activity, however, is a concern and proper design should be incorporated in any civil works.

Land Use. The area of influence of the project (approximately 35 hectares) is used for cattle farming. Other zones in the area are used for agricultural production.

Terrestrial Flora and Fauna. The surrounding area is characterized by dry tropical forest. Some mammals, birds, amphibians and reptiles are present. The area of influence of the project is primarily pastureland. Since the area is used for cattle, terrestrial fauna is scarce.

Local Communities. The closest town is 5 km from the project site, with an estimated population of 50. The villages in the area have a high unemployment rate. The landowner where the windfarm will be located will lease the land to the project.

Cultural Property. Preliminary analyses indicate that no archeological sites exist in the area of construction.

Compliance with World Bank Safeguard Policies

Safeguard Policy	Is Policy triggered? Y/N	Main Environmental/Social Issues
Environmental Assessment (OP 4.01)	Yes	Construction impacts Impacts on birds
Forestry (OP 4.36)	No	
Involuntary Resettlement (OD 4.30)	No	
Indigenous Peoples (OD 4.20)	No	
Safety of Dams (OP 4.37)	No	
Pest Management (OP 4.09)	No	
Cultural Property (OPN 11.03)	No	
Natural Habitats (OP 4.04)	No	
Projects in Disputed Areas (OP 7.60	No	
International Waterways (OP 7.50	No	

Potential environmental and social impacts of the project without safeguards:

Environmental	**Magnitude (High, Medium, Low)**	**Comments**
Construction Impacts		
Increased erosion	Low	Caused by improper siting of access roads, transmission lines, other civil works
Loss of natural vegetative cover	Low	Caused by improper siting of access roads, transmission lines, other civil works
Soil contamination due to oil and fuel spills	Medium	Due to spillage
Water contamination	Medium	From improper disposal of wastes
Generation of debris	Medium	Debris generated during excavation
Dust and noise emission	Low	
Generation of domestic wastes	Low	
Esthetic Impacts		
Deterioration of landscape beauty	Medium	From towers
Operational Impacts		
Noise	Low	From towers
Bird kills	Low	From towers
Social		
Social Issues		
Interaction of the project personnel with the community	Medium	
Demand of goods and services	High	
Hiring of manual labor	Low	
Deterioration of roads	Low	
Traffic congestion	Low	
Purchase of properties	High	
Chance finds (archeological sites)	Low	

Alternatives examined and rationale for selecting this project (1 page max):

Costa Rica's energy expansion plan includes provision for 30% renewable energy. The country is expanding its portfolio of renewables, including hydropower, wind power and geo-thermal power. Wind energy is a truly clean source of electricity, and will substitute thermally-generated power. In certain regions of Costa Rica, climatic conditions are appropriate for development of wind power.

Technical alternatives considered included different turbines. Turbines were chosen with low noise emissions and no impact on birds.

Public consultation:

The city of Santa Cruz is directly involved with the project, since it is where the administrative infrastructure is located. Other cities (Barnabela, Cacao, Santa Barbara) are smaller with less infrastructure, but are within the indirect area of influence. All communities will be impacted positively, since the road infrastructure and electricity network will improve. The project will generate employment for the communities. The project has approached all the surrounding communities and landowners, to discuss the project and address any questions. Agreement has been reached with the landowners to lease the land where the windfarm will be located.

Reference to the Environmental Management Plan:

Program/Activity	**Responsibility**	**Timing/Schedule**
Design	**COOPEGUANACASTE**	**Design**
Siting appropriate given seismic considerations		
Technology chosen which is bird-friendly and emits little noise		
Construction Monitoring Plan	**Contractor**	**Regular monitoring during construction**
Limitation of tower base to 100 m2		
Proper siting of towers, ? km of access roads, civil works		
4 km of transmission line to parallel existing road		
Revegetation of any denuded areas		
Waste management		
Worker training/education		
Installation of temporary worker camp		
Repair and improvement of approx. 20 km of roads to allow passing of heavy equipment and towers		
Chance Finds	**COOPEGUANACASTE**	**During construction**
Archeologist on-site during		

excavation, on call for construction phase		
Land Acquisition	COOPEGUANACASTE	**Prior to construction**
All landowners adequately compensated		
Community Relations	Contractor/ COOPEGUANACASTE	**Regular follow-up during design, construction and operation stage**
Use of local labor, where possible	Contractor	
Proper scheduling of transport of towers to avoid conflict with tourists	Contractor	
Building of small museum on wind power	COOPEGUANACASTE	

Summary of EIA report - Cote Hydropower Project

Name of the project:	Cote Hydropower Project
Location (map attached):	Tilarán, Guanacaste
Energy technology (wind/hydro):	Hydropower
(Additional) power installed in the project:	6.3 MW
Likely date of commissioning of the project:	Underway

Compliance with SETENA/MINAE

EIA report approval by SETENA (status and date):	April 18, 2001 (Resolution 0237-2001-SETENA)
Water rights approval by MINAE/Water (status and date):	Pending

Existing environmental and social conditions (1 page max):

Geology. The Cote H.P. is located in the mountainous country of the northern border of the Arenal depression. The stratigraphic base of the project's area is volcanic rock. The dominant tectonic structures have a northeast-southeast alignment.

Hydrology. The average rainfall for the area is 4,500 mm/year. Many tributaries feed into the Cote lake, the most important being the Pierna de la Laguna river. The flow at the project site has an average annual from of 1.97 m3/s, ranging from 0.4 m3/s in April to 3.13 m3/s in August. The water from the existing project drains into the Rugama, a tributary to the Arenal lagoon. The Rugama has an average annual flow of 0.21 m3/s, ranging from 0.04 m3/s in April to 0.34 m3/s in August. Maximum flow in the Rugama was calculated through Gumbel distribution, assuming a design flow with a return period of 500 years, the flood flow is 39.0 m3/s.

Natural Disasters. Aside from flooding (see above), the natural disaster risks in this area are limited to seismic and volcanic activity. These were both considered in the design of the project, again based on a return period of 1 in 500 years.

Land Use. The Cote watershed (15.3 km2) mostly consists of forests important for the protection of the flora and fauna, aquifer recharge, genetic reserves and esthetic beauty. The soil of the watershed Rugama (1.8 km2) has good drainage, is very steep and has low fertility; its importance is mainly as forest cover. Economic activities in the region are tourism (upper watershed) and agriculture (lower watershed).

Water Rights. The only river effected by the project, the Rugama, has no known water uses save serving as the major inflow into the Arenal lagoon.

Terrestrial Flora and Fauna. Intense deforestation in the past altered the weather conditions in the area, increasing the temperature and the wind speed, changing soil humidity, evaoptranspiration and the runoff from rivers. Based on Holdridge's classification system, the area is humid and highly humid pre-montane tropical forest. In the areas where the facilities

already exist, there is a significant amount of underbrush and aquatic plants at the shore of the lagoon, near the intake. Pines were planted along the tunnel, and ipil-ipil was planted around the lagoon. Above the canal, there is a secondary forest which is highly mixed and intervened. In the area which the project will intervene, between the tunnel exit and the first canal intake, a high quality forest exists (some primary). The tunnel extension crosses some forested area, but mostly pastureland. The second canal, the antechamber and the beginning of the pressure pipe are in an area with primary forest. This area also suffers from landslides. The majority of the pressure pipe crosses fairly polluted (trash) pastureland. Finally, the machine house and the tailrace canal are in a very intervened zone. Spotted cavies, red coatis, foxes, and squirrels are all common. Monkeys frequent the area, as are birds. Many of the 284 species of birds that have been reported in the area are protected by law to some degree.

Aquatic Flora and Fauna. The aquatic environment associated with the project is the Cote Lake, the Ruguma creek and the Cote river. With the construction of this project, the Ruguma creek will return to its natural state (prior to the ICE dam built in 1982). The Cote river will remain at its current, diverted (and almost dry) state. The Cote lake water is dark, with low light penetration. There is no evidence of endemic fish in the lake, nor in surrounding rivers. Many frogs and other amphibians are common. Otters have been spotted. The lake is surrounded by some wetlands.

Local Communities. Two communities are located in the project area of influence, the village of Arenal de Tilarán and the village San Rafael de Guatuso. San Rafael has a population of 6,694, whose main economic activities include grain, vegetable, fruit and dairy production. Arenal has a population of 2,180, whose main economic activity is tourism. The communities have access to education, health services, drinking water, public transportation and electricity. A social assessment was completed during project preparation, and these communities were targeted during project public consultation.

Cultural Property. Based on information from the National Museum of Costa Rica, no known archeological sites exist in the project area.

Compliance with World Bank Safeguard Policies

Safeguard Policy	Is Policy triggered? Y/N	Main Environmental/Social Issues
Environmental Assessment (OP 4.01)	Yes	Construction impacts Loss of vegetation and forest cover Loss of aquatic vegetation Flooding of lake-side properties
Forestry (OP 4.36)	No	
Involuntary Resettlement (OD 4.30)	No	
Indigenous Peoples (OD 4.20)	No	
Safety of Dams (OP 4.37)	No	
Pest Management (OP 4.09)	No	
Cultural Property (OPN 11.03)	No	
Natural Habitats (OP 4.04)	Yes	Loss of vegetation and forest

		cover Loss of aquatic vegetation Project located in national park
Projects in Disputed Areas (OP 7.60)	No	
International Waterways (OP 7.50)	No	

Potential environmental and social impacts of the project without safeguards:

Environmental	Magnitude (High, Medium, Low)	Comments
Construction Impacts		
Removal of fertile layer	High	Due to construction of infrastructure and roads
Soil contamination	Medium	Due to presence of workers and machinery
Changes in aquatic and terrestrial flora and fauna	High	Due to construction of works, access roads, transmission line and to increasing level of Cote lake by 1 m
Water quality deterioration	High	Due to erosion, eutrofication, spillage of waste
Slope instability	Medium	
Fragmentation of habitat	Medium	
Change in soil moisture conditions	Low	
Generation of debris	Medium	Debris generated during excavation
Change in landscape	Low	Most conduction structures will be underground
Contamination due to oil and fuel spills	Low	
Dust and noise emission	Low	
Generation of domestic wastes	Low	
Operational Impacts		
Eutrophication of the lake	High	Due to flooding of riverside vegetation
Change in stream flow	Low	
Social		
Social Impacts		
Interaction of the project personnel with the community	High	
Demand of goods and services	High	
Hiring of manual labor	Low	
Deterioration of roads	Low	
Traffic congestion	Low	
Improved roads and electricity service	High	
Purchase of properties	High	
Chance finds (archeological sites)	Low	

Alternatives examined and rationale for selecting this project (1 page max):

The responsibility of the National Power and Light Company (CNFL) is to contribute to the economic and social growth of the country, through the distribution of electricity in the Great Metropolitan area of San Jose. In view of growth of the energy demand, the CNFL decided to increase its production, which is why it structured a generation development plan in order to increase its installed capacity. With this potential, which will be totally hydroelectric, aside from fulfilling part of the demand from the customers of the area served, the CNFL will provide the country with a significant saving of foreign exchange, and will protect the environment by helping contain the growth of thermal generation based on the use of imported fuells.

CNFL analyzed many project from a profitability perspective, including technical, economic, environmental, social and organizational issues. CNFL has the use of the waterfalls from Cote Lake to the Arenal Reservoir, which would generate approximately 6 MW. This project possesses certain advantages, including: existence of structures that maybe used by the new project design, the existence of a regulating reservoir induced 19 years ago that allows the supply of peak energy, access to nearly all the existing work areas, the protection of the basin by the State and the ownership of most of the land by ICE. Due to these factors, CNFL included the Cote HP among its project portfolio. The project is already under construction, and is fully complying with all technical, environmental, and social recommendations defined in the feasibility and environmental impact studies.

Public consultation:

The two effected populations, San Rafael de Guatuso and Nuevo Arenal have been involved in extensive consultations with project proponents. Their perceptions of the project were documented during the social assessment, and included positive (source of work, better access, better traffic control) and negative (negative effect on ecology, negative effects on the lake level, negative effect on downstream aquatic vegetation). Compensatory measures have been agreed upon, including slight road improvement, small infrastructure improvements in the village of Nuevo Arenal, and establishment of a community feedback mechanism. No downstream water users will be affected, since there are no water users along the stretch of Rugama creek with future reduced flow.

Local landowners who are effected by the project have also signed agreements to sell the required land to the project.

Reference to the Environmental Management Plan:

Program/Activity	**Responsibility**	**Timing/Schedule**
Proper Construction Practices	**Contractor**	**Constant monitoring during construction phase**
Proper transportation of materials		
Construction of debris dump		
Machinery inspection for air emissions and noise		
Pits for oil changes and sealed containers for transportation		
Traffic control (schedule and speed)		

Adequate septic tanks, drainages		
Use of sanitary landfill for disposal of wastes		
Repair of damaged roads due to heavy equipment		
Worker education and sanctions		
Proper signage of site		
Enforcement of occupational safety regulations		
Emergency medical services provided		
Mitigation to natural habitats	CNFL/Contractor	**Regular follow-up furing construction and operation**
Reforestation program	CNFL/Contractor	
Revegetation program	Contractor	
Aquatic monitoring program	CNFL	
Water quality monitoring program	Contractor	
Change from open waterway for underground fiberglass pipe to avoid habitat fragmentation	CNFL/Contractor	
Biodiversity monitoring	CNFL/Contractor	
Soil Instability	**Contractor**	**Regular follow-up during construction**
Restoration along waterway and roads with native species known as soil stabilizers		
Excavation and water-tightness control for the tunnel		
Chance Finds		
Archeological evaluation completed		Completed during design stage
Archeologist on-site during excavation, on call for construction phase		
Land Acquisition	CNFL	**Prior to construction**
All landowners adequately compensated		
Community Relations	CNFL/Contractor	**Regular follow-up during design, construction and operation stage**
Presentations to local communities on project activities	CNFL	
Hiring of local labor, use of local goods and services	CNFL/Contractor	

Coordination with community commission	CNFL	
Repair damaged roads, improve secondary roads	Contactor, CNFL	
Improve electricity service quality to the area	ICE/CNFL	
Coordination of joint activities with local institutions, and follow-up on future petitions and requests	CNFL	

Annex 7: Map Section