

**Updated Project Information Document (PID)****Report No: AB66**

**Project Name** COLOMBIA-COLOMBIA - Amoya River Environmental Services  
**Region** Latin America and Caribbean Region  
**Sector** Renewable energy (80%); Water supply (20%)  
**Theme** Climate change (P); Biodiversity (S); Water resource management (S)  
**Project** P078220  
**Borrower(s)** GENERADORA UNION  
**Implementing Agency(ies)** GENERADORA UNION  
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**1. Country and Sector Background****Increased reliance on thermal-based generation capacity.**

After severe droughts, in the 1990s (i.e. 1992, 1997), that caused power shortages with associated forced rationing, the system has encouraged the development of more thermal generation capacity, specifically with the intention of increasing the share of firm capacity and enhancing the system's reliability of supply. The increase in thermal share has also been the indirect result of the withdrawal of the public sector in large investments and the reluctance of private generators to enter the hydro electric generation and associated environmental and social requirements. While this responds to the need for flexibility and robustness of the system, the increase in thermal share contributes to the gradual increase of GHG emissions by the sector and the release of local criteria pollutants (such as NO<sub>x</sub> and, SO<sub>x</sub> particulates and volatile hydrocarbons, which have been linked to health impacts on exposed populations).

**Hydropotential, while large is not being expanded.** Colombia has extensively used hydro as a

clean source of energy that represents about two thirds of installed capacity, aided by a generous water regime and the orography of the country. Hydro capacity consists of a few large facilities, accounting for most of the hydro supply and a few smaller units with negligible contribution. The large facilities typically require sizable capital investment, which in the current fiscal climate is difficult to secure. Also, several of the existing facilities have been linked to significant environmental and social impacts. As a result, despite the hydro potential, newer additions to the power mix have been thermal.

**Negligible contribution of other renewables in the energy mix.** Studies undertaken by the Government (ACC, 2001) and third parties have indicated a significant potential of renewable energy in the country, including solar and wind. However, until very recently, renewable energy had not figured in the plans or official prospects for the power sector. While the situation has changed with the construction of the Jepirachi project (Wind energy), and others being proposed, the contribution of renewables to the power mix remains negligible. Many obstacles remain for these options to play an important role in the country, including lack of knowledge and practical experience, poor competitiveness for some applications, limited institutional interest and lack of awareness.

**Limited security of supply in the power sector.** While the country is largely integrated through the SIN, regional security of supply varies a lot. This is caused by the limited redundancy in the national transmission lines, and the existence of large tracks of outdated transmission systems. The limited redundancy makes regional supply, especially in areas affected by guerrilla attacks, vulnerable to collapse.

**Impact of climate change on the endowment base for generation capacity.** Colombia has recently, has completed its first communication to the UNFCCC, including an assessment of the anticipated impacts of climate change and its vulnerabilities to these impacts. The communication concludes, in the context of expected changes with potential impact for the energy sector, that a significant fraction of the territory will be affected by variations in the hydrological system and rainfall patterns. In particular, there is a likelihood of an increase in the rate of decertification in high mountain ecosystems (source of many of the head waters of the largest rivers of the nation). The process will be caused by reductions in rainfall patterns, higher rates of evapo-transpiration and the consequent drying of these ecosystems. The impact over the overall hydro generation capacity has yet to be estimated but is likely to result in a reduction in the net flow of some rivers fed by headwaters located in the Andes, in particular over the Western range of the Andes. The character of the Paramo ecosystem (high mountain range, typically over 3500 meters altitude) is also likely to be affected and the communication forecasts a 75-85% in the reduction of the area of Paramo. This change is of grave significance because of the role the Paramo plays in water regulation and storage in the Andes.

## **2.1 Government Strategy**

### **National Development Plan (NDP)**

The National Development Plan of Colombia developed under the previous administration, proposes two strategies for the development of the national energy infrastructure: a) attract

foreign direct investment and increase private participation, and b) strengthen the institutional structure for the planning, control and design of sectorial regulatory frameworks. In particular, the PND emphasizes the importance of promoting sustainable development and internalizing key environmental and social variables into the design and implementation of sector public policies. As part of the national environmental policy, the NDP promotes two priority programs: 1) “Clean Production” to promote the diffusion of new cleaner technologies and 2) “Green Markets” to enhance participation in markets that promote sustainable development (e.g. market based instruments, carbon market).

### **National Energy Plan (NEP)**

The National Energy Plan, is being updated. For the particular case of the electricity sector, the draft NEP calls for:

- Reconcile energy policies with national environmental priorities
- Strengthen scientific research and development activities in the energy field
- Apply incentives to attract private investment
- Diversify sources of energy production
- Promote the export of electricity
- Reduce transmission restrictions and losses
- Improve the mechanisms and actions of the wholesale electricity market
- Restructure institutional and financial structure of distribution companies
- Expand coverage to rural and isolated areas

### **2. Objectives**

The development objective of the Rio Amoya Environmental Services Project (Amoya Project, or AP) is to contribute to the reduction of greenhouse gas (GHG) emissions from the power sector in Colombia through the promotion of a 80 MW run-of-river generation facility. The project is expected to displace an estimated 2.53 million metric tons of carbon dioxide equivalent (mtCO<sub>2</sub>e) over an initial period of 7 years, an estimated 5.43 mt CO<sub>2</sub>e over 14 years, and 7.87 mtCO<sub>2</sub>e until 2025. It will also support an environmental program for the protection of the Paramo de Las Hermosas and a social program that will contribute to improvements in the welfare of the local community in the municipality of Chaparral.

### **3. Rationale for Bank's Involvement**

Carbon Finance is a new product of the World Bank to demonstrate how market-based emissions transactions can mitigate global climate change and pioneer emission reduction purchase transactions. The Bank's involvement helps to ensure quality of the first carbon projects, while providing necessary project due diligence and other fiduciary responsibilities.

The value-added of Bank support also 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 Latin America as well as knowledge of climate change mitigation programs both

regionally and worldwide. Finally, Bank involvement links together the experience and lessons of its sector work (NSS), institutional development (support to the OCC) and the project. All this work comes together in the AP.

#### 4. Description

The project supports 3 activities (components):

**A. Renewable Energy Production:** A run of the run-of-river power plant, with a nominal capacity of 80 MW and an anticipated generation of 568 GWh/year will be supported. The power plant will be connected to the grid through an 18km transmission line. The plant is expected to be in operation by the end of 2005. Support will be provided through the purchase of CERs.

**B. Environmental Program.** The program aims at promoting conservation of the Paramo ecosystem in the area of the project, therefore maintaining its ability to regulate the water cycle in the surrounding area (the Paramo replenishes the rivers and acts as a climate regulating system) and thus would contribute to maintaining the long-term water supply to the region and the power plant. These conservation activities will also contribute to the maintenance of the highly bio-diverse habitat, characteristic of the Paramo Las Hermosas. Specifically, the program includes activities that support the long term sustainability of the Paramo's ecosystem, and divert potential anthropogenic interventions induced by global warming (potential occupation of buffer zones induced by warmer temperatures). This program will be managed locally (see Annex V for a detailed description of the program) and includes the following activities:

1. Characterization and conservation plan for the Paramo's soil cover.
2. Water cycle study for the Paramo.
3. Program for environmental education and awareness on the role and services of the Paramo.
4. Program for the Conservation of the Endangered Megafauna of the highlands, with emphasis in Spectacled bear (*Tremarctos ornatus*) and Mountain Tapir (*Tapirus pinchaque*) and Monitoring and conservation program for small vertebrates and plants.
5. Characterization and recovery study for restoration of the natural ictio-fauna in the Amoya River.
6. Support program for small scale organic agro-industry and eco-tourism in the area.

**C. Social Program.** This program includes specific activities in health, education, green employment generation and other social services, and has been designed as an output of an extensive and thorough consultation and participation program with the local community (Municipality of Chaparral), including public audiences and innovative workshops (see Annex ). The program will be launched at the beginning of construction and will be in place for a at least a period of 2 years. In particular, the creation of green employment (e.g. reforestation, organic and conservation agriculture, water sanitation) will be contribute with the improving the environmental management of the area.

The funding for the implementation activities contemplated in both programs, the Environmental and Social, are expected to be partly financed with 20% of the carbon revenues (10% for each

program) and a matching financial contribution from Conservation International for the environmental program.

### TIMETABLE

Activity	Year		2004		2005	
	2003		2004		2005	
	1 <sup>st</sup> semester	2 <sup>nd</sup> semester	1 <sup>st</sup> semester	2 <sup>nd</sup> semester	1 <sup>st</sup> semester	2 <sup>nd</sup> semester
Run of the River						
Environmental Program (design)						
Feasibility Study (Done)						
Environmental assessment						
Social assessment						
Access roads and camping						
Equipment supply bidding process						
Equipment manufacturing installation						
Civil work						
Starting of RA operations						
Social consult						

### Project Costs (in E\$million)

Renewable Energy Production: Indicative Cost (US\$M) 97.00

Environment Program: Indicative Cost (US\$M) .90

Social Program: Indicative Cost (US\$M) .25

### 5. Financing

**Source (Total ( US\$m))**

BORROWER (\$97.00)

**Total Project Cost: \$97.00**

### 6. Implementation

The project's promoter is **GENERADORA UNION SA ESP. HIDROGER SA ESP**, a company set up by Generadora Union and other shareholders (ISAGEN and others) will own, and also be responsible for the construction, operation and commercialization of the energy and carbon finance revenues of the project.

### Location of the Project

The Project will be situated in the municipality of Chaparral (Tolima province), Colombia, in the lower range of the Amoya River Basin. Chaparral is located at 262 Km from Bogota, and this region is contained within the Paramo ecosystem of Las Hermosas, that constitutes a significant reservoir of biodiversity and water in the Country.



**emission reductions.**

<b>Year</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
Net Generation (GWh)	568	568	568	568	568	568
Total ER (thousand tons CO <sub>2</sub> e)	346	616	274	302	263	290
PCF purchased requested (thousand tons CO <sub>2</sub> e)	346	616	274	302	263	290
PCF payment requested (EURO\$ million)	1.38	2.46	1.09	1.20	1.05	1.16

<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
568	568	568	568	568	568	568	568	568
434	324	388	399	394	485	485	485	485
434	324	388	399	394	485	485	485	485
1.73	1.29	1.55	1.59	1.57	1.94	1.94	1.94	1.94

**7. Sustainability**

The Amoya Project has the technical, organizational and financial characteristics of a sustainable project. The financial strength and commitment of the sponsor provide assurances for the sustainability of the project. The social and environmental programs plan engages the local population and provides assurances of their support. The nature of the technology selected and its relatively low maintenance guarantee continuous operation for extended periods of time. The technical and economic feasibility studies, the environmental impact assessment, the financial analysis, and the baseline assessment have provided the necessary information to confirm the sustainability of the AP.

As it was described above, the AP will contribute to sustainability in different ways. It will demonstrate the potential for run-or-river facilitating the development of this option in other regions of the Country; Contribute to reduction in emissions of local criteria pollutants, which is going to have a direct impact in the health of the local population; Add to the national private sector, expertise in the installation and operation of the run-of -river power generation; Increase technology diversification in the power sector; and Recognize the environmental value of the region, specifically of the Paramo ecosystem.

**8. Lessons learned from past operations in the country/sector**

The project has benefited from the emerging experience built in other PCF projects that are being conducted in different Latin American nations (e.g. Jepirachi, Carbon Off-set in Colombia, Chacabuquito in Chile, Umbrella Project for Renewable Energy Sources in Costa Rica). In particular, on the basis of these experiences, the project emphasizes the local development linkages and seeks to ensure a strong partnership with the local population which have been found essential for long-term sustainability in similar operations.

The baseline adopted is the used for Jepirachi, given that no major changes have occurred. The Verification Protocol will benefit from the experience being gained through the Jepirachi project.

**9. Environment Aspects (including any public consultation)**

**Issues** : There are no major negative environmental impacts that would call the project into question. Currently Generadora Union is in the process of conducting a detailed environmental assessment with an expected completion date of June 16, 2003. However, in case of presenting some negative impacts these will be carefully mitigated or minimized through the programs and strategies established in the environment management plan.

**10. List of factual technical documents:**

Draft Environmental Impact Assessment  
Social Participation and Consultation Process  
Financial Analysis of the Amoya Environmental Services Project  
Project Description

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**Note: This is information on an evolving project. Certain components may not be necessarily included in the final project.**