Initial CDM Project Portfolio for the Republic of Panama

Prepared by:
Emilio Sempris

As part of:
Institutional Support for Sustainable Environmental Management of the Panama Canal Watershed Project, managed by International Resources Group, Ltd.

Financed by:
USAID/Panama

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Environmental Policy and Institutional Strengthening Indefinite Quantity Contract (EPIQ)

Partners: International Resources Group, Winrock International, and Harvard Institute for International Development

Subcontractors: PADCO; Management Systems International; and Development Alternatives, Inc.

Collaborating Institutions: Center for Naval Analysis Corporation; Conservation International; KBN Engineering and Applied Sciences, Inc.; Keller-Bleisner Engineering; Resources Management International, Inc.; Tellus Institute; Urban Institute; and World Resources Institute
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FOREWORDS

The National Government’s "Plan for Economic, Social and Financial Development with Investment in Human Capital" establishes that economic policy will be founded on the principles of social solidarity within a free market economy, while the State continues to assume its role in facilitating and promoting economic activity. It is within this context that the State continues to promote growth in the area of exports, assures greater efficiency and productivity in the use of natural resources, and encourages investments in - and the qualitative and quantitative growth of - human capital.

To this end, the Government of Panama, through the National Environmental Authority (ANAM), has participated actively in the international environmental negotiations, at both the United Nations Framework on Climate Change, and the Kyoto Protocol and its Clean Development Mechanism, thus proving its unrestricted political will to tackle the issue of global climate change. To date, Panama is one of the most advanced developing countries in the implementation of the Convention, the Kyoto Protocol and its Clean Development Mechanism, whose the ultimate objective is to assist developed countries in complying with part of their greenhouse gases (GHG) quantified limitation and reduction commitments, by means of purchasing Certified Emission Reduction (CERs), generated by project activities in developing countries in the fields of energy, industrial processes, agriculture, forestry and waste; an economic formula that translates into a new category of national environmental title for exportation, the reduction of GHG emissions.

Additionally, and following the prompt ratification of the Convention and its Protocol, and three years of national efforts towards the elaboration of the Initial National Communication, the Government of Panama has taken a step forward with the establishment of the National Program on Climate Change (PNCC) and the Panamanian Environmental Services Foundation (FUPASA), an effort which fully identifies with the ultimate objective of the United Nations Framework on Climate Change "To achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climatic system, in order to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner".

It is a great honor for me to present, on behalf of the Government of Panama, the "Initial CDM Project Portfolio for the Republic of Panama". This portfolio is the product of the collective commitment of government agencies, the private sector, international cooperation agencies and non-governmental organizations, and is geared towards the development of programs and measures that incorporate climate change into the process of planning for a sustainable national development.

Ricardo Anguizola
General Administrator
National Environmental Authority
Republic of Panama
INTRODUCTION

The Initial CDM Project Portfolio for the Republic of Panama has been developed within framework of the project "Institutional Strengthening of FUPASA", funded by the USAID, through International Resources Group, Ltd. This project has as its main objective to present to international investors with the a Panamanian set of CDM project profiles according to the Kyoto Protocol of the United Nations Framework on Climate Change.

This Initial Portfolio consists of twenty-seven (27) project profiles, divided into two large sectors.

- Energy Sector
- Non-Energy Sector

There are twenty (20) profiles presented in the energy sector, and seven (7) profiles in the non-energy sector.

In the drafting of the Initial Portfolio of CDM projects, consideration was given to the national priorities for sustainable development which are set forth in the different plans and policies of the Government of Panama.

Care was taken during the development of the project profiles to assure that they cover a a series of aspects underlined by the Clean Development Mechanism, among which are:

- General description of the project
- Definition of the legal aspects of the CDM project
- Potential mitigation of GHG
- Costs
- Project feasibility
- The project's contribution to sustainable development and the transfer of technology; and
- Risks

Included as a component of the project profiles is the potential tonnage reductions of carbon dioxide equivalent per year (TCO₂ eq./year),
PANAMA: GENERAL INFORMATION

The Republic of Panama is located along the narrowest stretch of the Central American Isthmus, and serves to join North and South America. The country has a total area of 75,517 km². Panama lies within the 75th meridian to the west of Greenwich (local time is 5 hours behind Greenwich time). It borders on the west with the Republic of Costa Rica, on the east with the Republic of Colombia, on the north with the Atlantic Ocean and on the south with the Pacific Ocean.

The capital city and province of the Republic of Panama is Panama. Both modern and colonial, Panama City lies along the coast of the Gulf of Panama, which opens into the Pacific Ocean.

Approximately 90% of the population of Panama professes the Roman Catholic faith. In an atmosphere of religious tolerance, other faiths which are practiced are: Hinduism, Judaism, Protestantism, etc. The population of Panama is multicultural, including indigenous communities, Europeans, Chinese, Jews and Afrocaribbeans.

The year-round climate in the lowlands of Panama is tropical, with an average temperature of 27 degrees centigrade, and temperate tropical in the highlands, with an average temperature of 18 degrees centigrade. Relative humidity is approximately 78%. There are two seasons: the winter or rainy season, which extends from May to November, and the summer or dry season, which extends from December to April, approximately.

The average rainfall for the Atlantic Coast is 2,500 mm, and for the Pacific, 1,750 mm. In spite of increased precipitation during the rainy season, it is a rare day when the sun does not appear for at least a portion of the day.

The official language is Spanish. English is widely spoken and understood throughout the country. English is a mandatory course of study in high school and is spoken in all levels of society and within the business community.
General Information

Official name: Republic of Panama
Area: 75,517 km²
Boundaries: To the north, the Caribbean Sea; to the east, Colombia; to the south, the Pacific Ocean; to the west, Costa Rica.
Capital: Panama City
Language: Spanish (official)
Nationality: Panamanian
Currency: Balboa (circulates alongside the US$)
National Holiday: November 3, independence from Colombia
Official time: GMT - 5 hours (normal)
National flower: Holy Spirit Flower, a small orchid
Political division: 9 provinces and 4 indigenous territories

Demography

Population: 2,839,177(a) inhabitants (2000)
Rate of population growth: 2% annual (1990-2000)
Density: 37.6 inhabitants per Km² (2000)
Birth rate: 21.4 per 1000 (2000)
Mortality rate: 5.1 per 1000 (2000)
Life expectancy: 74.4 años (2000)
Main cities (inhab.): Panama City, Colon, David, San Miguelito, Santiago.

Education

Literacy: 92.3%
Religion: Catholic

Economy

Principle products: Bananas, sugar, coffee, shrimp, clothing, petroleum derivatives
Estimated real BIP growth rate: 1.0%
Estimated BIP at current prices: US$ 10,245(E) million (2001)
Tasa de crec. PIB corriente: 2.3%(E) (2001)

* Drafted by the Bureau of Economic Analysis and Policies of the Ministry of Economy and Finance, based on information supplied by the Statistics and Census Bureau of the General Comptroller.
### Panamanian Economic Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>III Trimester</th>
<th>Var.%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation rate:</td>
<td>0.3% (2001) third trimester.</td>
<td></td>
</tr>
<tr>
<td>Exports:</td>
<td>US$ 5,748.8 million (2000)</td>
<td></td>
</tr>
<tr>
<td>Imports:</td>
<td>US$ 7,039.7 million (2000)</td>
<td></td>
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</tbody>
</table>

#### Panamanian Economic Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2000</th>
<th>2001 (P)</th>
<th>2000/01</th>
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</thead>
<tbody>
<tr>
<td><strong>Agricultural Sector</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exportation of Bananas (in thousands of net kilos)</td>
<td>127,009</td>
<td>103,152</td>
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<tr>
<td>Production of Sugar (in metric tons)</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Livestock</td>
<td></td>
<td></td>
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<tr>
<td>Beef cattle sacrificed (heads)</td>
<td>73,456</td>
<td>68,265</td>
<td>-7.1</td>
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<tr>
<td>Hogs sacrificed (heads)</td>
<td>83,096</td>
<td>65,201</td>
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<tr>
<td>Production of chicken meat (in thousands of kilos)</td>
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<td>18,186</td>
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<td>Purchase of Raw Milk (in thousands of kilos)</td>
<td>40,896</td>
<td>41,604</td>
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<tr>
<td><strong>Fishing</strong></td>
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<tr>
<td>Exportation of Shrimp (in thousands of net kilos)</td>
<td>2,257</td>
<td>2,448</td>
<td>8.5</td>
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<tr>
<td>Production of Fish Meal (in thousands of kilos)</td>
<td>9,206</td>
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</table>

#### Industrial Sector

<table>
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<th>2000/01</th>
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<tbody>
<tr>
<td>Manufactured Industry</td>
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<td>General Index of Physical Production (average)</td>
<td>105.7</td>
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<td>Industrial Energy Consumption (in thousands of KWH)</td>
<td>126,641</td>
<td>107,627</td>
<td>-15.0</td>
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<tr>
<td>Production of Tomato Derivatives (in thousands of kilos)</td>
<td>2,058</td>
<td>2,891</td>
<td>40.5</td>
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<tr>
<td>Production of Beer (in thousands of liters)</td>
<td>33,033</td>
<td>31,310</td>
<td>-5.2</td>
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<tr>
<td>Production of Alcoholic Beverages (in thousands of liters)</td>
<td>2,896</td>
<td>2,820</td>
<td>-2.6</td>
</tr>
</tbody>
</table>

<p>| Construction                                   |        |          |         |
| Construction Permits (in thousands of US$)     | 123,909| 127,543  | 2.9     |
| District of Panama                             | 93,523 | 101,651  | 8.7     |
| Other Districts                                | 30,386 | 25,892   | -14.8   |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Value 1</th>
<th>Value 2</th>
<th>Change</th>
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<td>Production of Pre-mixed Cement (in m³)</td>
<td>162,711</td>
<td>115,148</td>
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<td>Electricity and Water</td>
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<tr>
<td>Generation of Electricity (in thousands of KWH)</td>
<td>1,177,994</td>
<td>1,248,371</td>
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<td>Hydraulic Electricity</td>
<td>913,594</td>
<td>642,205</td>
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<tr>
<td>Thermic Electricity</td>
<td>264,400</td>
<td>606,166</td>
<td>129.3</td>
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<tr>
<td>Billing of Water (in millions of gallons)</td>
<td>15,545</td>
<td>15,867</td>
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<td>Wholesale Commerce</td>
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<tr>
<td>Personnel Employed (average)</td>
<td>17,584</td>
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<tr>
<td>Salaries Paid (in thousands of US$)</td>
<td>45,799</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Total Income (in thousands of US$)</td>
<td>635,681</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>Retail Commerce</td>
<td></td>
<td></td>
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<tr>
<td>Personnel Employed (average)</td>
<td>24,259</td>
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<td>...</td>
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<tr>
<td>Salaries Paid (in thousands of US$)</td>
<td>41,042</td>
<td>...</td>
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<tr>
<td>Total Income (in thousands of US$)</td>
<td>503,022</td>
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<td>...</td>
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<tr>
<td>Hotels and Restaurants</td>
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<tr>
<td>Personnel Employed (average)</td>
<td>9,571</td>
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<tr>
<td>Salaries Paid (in thousands of US$)</td>
<td>13,125</td>
<td></td>
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</tr>
<tr>
<td>Total Income (in thousands of US$)</td>
<td>61,372</td>
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<tr>
<td>Daily Average of Room Occupancy (in units)</td>
<td>1,983</td>
<td>1,864</td>
<td>-6.0</td>
</tr>
<tr>
<td>Daily Average of Guests (persons)</td>
<td>3,214</td>
<td>2,869</td>
<td>-10.7</td>
</tr>
<tr>
<td>I.T.B.M.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sales (in thousands of US$)</td>
<td>16,339</td>
<td>15,411</td>
<td>-5.7</td>
</tr>
<tr>
<td>Transportation, Storage and Communications</td>
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<td></td>
</tr>
<tr>
<td>National Port System</td>
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<td></td>
<td></td>
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<tr>
<td>Container Movement (in Teu's)</td>
<td>365,233</td>
<td>428,901</td>
<td>17.4</td>
</tr>
<tr>
<td>Cargo Movement (in metric tons)</td>
<td>5,661,038</td>
<td>5,637,163</td>
<td>-0.4</td>
</tr>
<tr>
<td>Panama Canal Authority</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cargo Transported through the Canal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(in thousands of t. l.)</td>
<td>47,774</td>
<td>46,762</td>
<td>-2.1</td>
</tr>
<tr>
<td>Ship Transit through the Canal (in units)</td>
<td>3,098</td>
<td>3,048</td>
<td>-1.6</td>
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<tr>
<td>Financial Establishments</td>
<td></td>
<td></td>
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<tr>
<td>Internal Credit Balances (in millions of US$)</td>
<td>11,935</td>
<td>12,258</td>
<td>2.7</td>
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<tr>
<td>External Credit Balances (in millions of US$)</td>
<td>9,989</td>
<td>10,222</td>
<td>2.3</td>
</tr>
<tr>
<td>Interest Rate-Commercial Credit (percentage)</td>
<td>9.90</td>
<td>10.14</td>
<td>2.4</td>
</tr>
<tr>
<td>Interest Rate-Personal Consumption Credit (percentage)</td>
<td>13.20</td>
<td>13.07</td>
<td>-1.0</td>
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<tr>
<td>External Sector</td>
<td></td>
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<tr>
<td>Exportation of Goods F.O.B. (in thousands of US$)</td>
<td>201,348</td>
<td>197,916</td>
<td>-1.7</td>
</tr>
<tr>
<td>Description</td>
<td>2023</td>
<td>2022</td>
<td>Change</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>Petroleum Derivative Products</td>
<td>12,162</td>
<td>20,285</td>
<td>66.8</td>
</tr>
<tr>
<td>Bananas</td>
<td>39,054</td>
<td>29,169</td>
<td>-25.3</td>
</tr>
<tr>
<td>Shrimp</td>
<td>21,766</td>
<td>25,622</td>
<td>17.7</td>
</tr>
<tr>
<td>Coffee</td>
<td>636</td>
<td>782</td>
<td>23.0</td>
</tr>
<tr>
<td>Clothing</td>
<td>4,086</td>
<td>1,632</td>
<td>-60.1</td>
</tr>
<tr>
<td>Beef</td>
<td>1,815</td>
<td>3,439</td>
<td>89.5</td>
</tr>
<tr>
<td>Others</td>
<td>121,829</td>
<td>116,987</td>
<td>-4.0</td>
</tr>
</tbody>
</table>

**Exportation of Services**

<table>
<thead>
<tr>
<th>Description</th>
<th>2023</th>
<th>2022</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tolls Charged, Canal Authority</td>
<td>136,324</td>
<td>134,955</td>
<td>-1.0</td>
</tr>
<tr>
<td>Entrance of Passengers (in thousands)</td>
<td>309</td>
<td>312</td>
<td>1.0</td>
</tr>
<tr>
<td>Tourist Expenditures (in thousands US$)</td>
<td>117,200</td>
<td>123,527</td>
<td>5.4</td>
</tr>
<tr>
<td>Consumption On Board (in thousands US$)</td>
<td>45,763</td>
<td>34,367</td>
<td>-24.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>2023</th>
<th>2022</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Imports C.I.F. (in thousands US$)</td>
<td>840,576</td>
<td>748,109</td>
<td>-11.0</td>
</tr>
<tr>
<td>Capital Properties</td>
<td>174,937</td>
<td>119,129</td>
<td>-31.9</td>
</tr>
<tr>
<td>Crude Petroleum</td>
<td>129,475</td>
<td>123,447</td>
<td>-4.7</td>
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<td>Food Products</td>
<td>80,143</td>
<td>82,158</td>
<td>2.5</td>
</tr>
<tr>
<td>Other Consumable Goods and Intermediates</td>
<td>456,021</td>
<td>423,375</td>
<td>-7.2</td>
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</tbody>
</table>

**Colon Free Zone**

<table>
<thead>
<tr>
<th>Description</th>
<th>2023</th>
<th>2022</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight of Imports (in thousands metric)</td>
<td>201.4</td>
<td>226.8</td>
<td>12.6</td>
</tr>
<tr>
<td>Weight of Reexports (in thousands metric)</td>
<td>164.9</td>
<td>184.2</td>
<td>11.7</td>
</tr>
<tr>
<td>Value of Imports (in millions US$)</td>
<td>1,208.0</td>
<td>1,245.7</td>
<td>3.1</td>
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<tr>
<td>Value of Reexports (in millions US$)</td>
<td>1,265.1</td>
<td>1,323.7</td>
<td>4.6</td>
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<tr>
<td>Net Export Value (in millions US$)</td>
<td>57.1</td>
<td>78.0</td>
<td>36.6</td>
</tr>
</tbody>
</table>

... Information not available.

(P) Preliminary Data.

**Source:**

Ministry of Economy and Finance, Bureau of Economic Analysis and Policy

http://www.mef.gob.pa e-mail: analeco@psi.net.pa

Department of Economic Information and Statistics of the Bureau of Economic Analysis and Policy, based on figures from the General Comptroller of the Republic and other Public Institutions of the Republic of Panama.
## INITIAL CDM PROJECT PROFILES IN THE ENERGY SECTOR

<table>
<thead>
<tr>
<th>Project</th>
<th>Province</th>
<th>River</th>
<th>Project Type</th>
<th>Power Installation MW</th>
<th>Promoter</th>
<th>Status</th>
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<tbody>
<tr>
<td>Algarrobos</td>
<td>Chiriqui</td>
<td>Casita de Piedra</td>
<td>Hydroelectric</td>
<td>11.2</td>
<td>Union FENOSA</td>
<td>Feasibility</td>
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<td>Quebro</td>
<td>Veraguas</td>
<td>Quebro</td>
<td>Hydroelectric</td>
<td>8.59</td>
<td>Hidroelectrica del Sur, S.A.</td>
<td>Pre-feasibility</td>
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<td>Chiriqui</td>
<td>Chiriqui Viejo</td>
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<td>Paso Ancho Hidropower Corp.</td>
<td>Feasibility</td>
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<td>Chiriqui</td>
<td>Chiriqui Viejo</td>
<td>Hydroelectric</td>
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<td>La Mina Hidropower Corp.</td>
<td>Feasibility</td>
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<td>Pando</td>
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<td>Chiriqui Viejo</td>
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<td>32.6</td>
<td>Electron Investments, S.A.</td>
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<td>Chiriqui</td>
<td>Chiriqui Viejo</td>
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<td>Feasibility</td>
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<td>Esti</td>
<td>Chiriqui</td>
<td>------</td>
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<td>120</td>
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<td>Bayano (No. 3)</td>
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<td>Macho de Monte</td>
<td>Chiriqui</td>
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<td>Hydroelectric</td>
<td>2.4</td>
<td>Unión FENOSA</td>
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<tr>
<td>Project</td>
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<td>Project Type</td>
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<tr>
<td>Cerro Tute y La Miel</td>
<td>Veraguas y Los Santos</td>
<td>-----</td>
<td>Wind</td>
<td>12 – 20</td>
<td>ETESA</td>
<td>Feasibility</td>
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<td>Rural Wind Project</td>
<td>Rural Areas</td>
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<td>2 – 5</td>
<td>ETESA</td>
<td>Project Idea</td>
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<tr>
<td>Valle de Anton</td>
<td>Cocle</td>
<td>Anton</td>
<td>Hydroelectric</td>
<td>1.8</td>
<td>Hidro Panamá, S.A.</td>
<td>In Operation</td>
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<tr>
<td>Hornitos</td>
<td>Chiriqui</td>
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<td>Chiriqui</td>
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<td>Hydroelectric</td>
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<td>Transport System for Panama City &quot;Tren Ligero&quot;</td>
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<td>MOP / BCEOM</td>
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<tr>
<td>Cerro Patacon Methane Recovery Project</td>
<td>Panama</td>
<td>-----</td>
<td>Waste Management</td>
<td>-----</td>
<td>Mayor of Panama City</td>
<td>Project Idea</td>
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<td>UTP</td>
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<td>Efficient Illumination on public buildings</td>
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INITIAL CDM PROJECT PROFILES IN THE NON-ENERGY SECTOR

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<td>Darién</td>
<td>Reforestation of the Chucunaque River upper basin</td>
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<tr>
<td>Cerro Patacon</td>
<td>Mayor of Panama City</td>
<td>Panamá</td>
<td>Reforestation of areas surrounding and within the Cerro Patacón sanitary landfill</td>
<td>15</td>
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<td>Chiriquí</td>
<td>AES Panama</td>
<td>Chiriquí</td>
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<td>El Copé National Park</td>
<td>San Felix Agroforestry</td>
<td>Coclé</td>
<td>Agroforestry and Nature Pasture Systems in the Buffer Area of El Copé National Park</td>
<td>N/A</td>
<td>Project Idea</td>
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<td>Bayano</td>
<td>AES Panamá</td>
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<td>Reforestation</td>
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<td>Santiago</td>
<td>Central Azucarera La Victoria</td>
<td>Veraguas</td>
<td>Treatment of Residual Water and Solid Waste</td>
<td>N/A</td>
<td>Project Idea</td>
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<td>Asoré</td>
<td>Veraguas Reforester's Association (ASOREVE)</td>
<td>Veraguas</td>
<td>Carbon capture through the cultivation of hardwood trees</td>
<td>1000</td>
<td>Project Idea</td>
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</table>
Cerro Patacon Methane Recovery Project

**Project Objectives**
Capture of methane produced by the decomposition of solid waste in Cerro Patacon sanitary landfill, for the generation of electricity.

**Project Description**
Methane is produced from solid waste by anaerobic decomposition. Solid waste decomposition represents approximately 20 percent of human-induced methane emissions. Emissions are expected to increase in the future, particularly in developing countries.

Methane emissions can be decreased in many ways, such as reducing solid waste generation (reduction of the source), deviating the loss away from disposal sites (in other words, through recycling or incineration), recovering garbage-generated methane, or insuring that garbage does not decompose in an anaerobic environment. In general terms, any technique or technology which reduces methane generation or converts methane to carbon dioxide through combustion, will reduce the net emissions of greenhouse gases.

The quantity of methane emitted into the atmosphere through solid waste disposal depends on the quantity of waste being disposed of, its composition, and the nature of the mechanism for disposal.

Since organic material can generate methane for as much as 10-30 years or more, appropriate programs for methane recovery must be directed particularly towards the reduction of greenhouse gases in regions where large quantities of organic waste have been or are currently being deposited in sanitary landfills. Depending on the site and the type of gas collection system to be installed, over 50% of the methane emitted can be recovered and used for generating electric energy.

The project consists of the generation of electricity through the use of methane produced by solid waste decomposition in the enclosed sector of Cerro Patacon sanitary landfill.
Project Justification
The project will utilize a non-traditional energy source, recovering the methane produced by decomposition of solid waste. The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution through the use of a greenhouse gas. The project is compatible with actions for mitigating the effects of climate change.
**Project: Improvements of Efficiency in Lighting of Public Buildings**

**Sector:** Energy

**Current Status:** Project Idea

**Estimated Emission Reduction (TCO2eq/year):** N / D

**Promoter:** Technological University of Panama

**Contact:** Ing. Jaime Contreras

**Address:** Technological University of Panama

**Phone Numbers:** (507) 236-4734

**E-mail:** jaimecontreras@hotmail.com

**Project Location:** Republic of Panama

**Estimated Cost:** N / D

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**Project Objectives**

To achieve better lighting in public offices through the application of strategies and measures which will produce effective savings in energy.

---

**Project Description**

Often, buildings in developed and developing countries are similar. Electricity is the dominant energy source, providing 70% of the energy demand in industrialized countries (EIA, 1994). However, the sources of this energy vary greatly from one country to the next. For example, carbon is the dominant energy source for Government advertising and structures.

The strategies to be applied in the buildings vary, depending on the size and type of construction and climate. Walls and roof insulation are important in many types of Government buildings. Modern commercial office buildings have overhead interior heat charges, produced by equipment and personnel, thereby diminishing the importance of insulation and increasing the importance of windows and glass building fronts. The strategies for equipment utilized in these buildings places emphasis on efficient air-conditioning, lighting and office equipment. Renewable technology strategies include photovoltaic systems, active and passive systems, and daylight. Often, the fact is overlooked that renewable strategies are highly efficient when integrated with the orientation of the building, form and design, and can be an important factor in restraining the growth of energy consumption in urban areas.

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**Project Justification**

The application of measures and strategies for the improvement of lighting in public buildings will permit the reduction of GHG emissions that are associated with the type of lighting systems currently in use.

It has been calculated that the sector comprising residential, commercial and institutional buildings consumed a third of the global energy used in 1990, and produced approximately a third of the CO2 emissions associated with this energy. Energy use ranges all the way from air-conditioning and lighting, to services such as food preparation and computer use. Emissions produced by the building sector include those which result from the direct use of fossil fuel, and fuel emissions associated with electricity and air-conditioning in the buildings. Over two-thirds of these emissions stem from residential buildings, the other third from commercial and institutional buildings.
Project: Hydroelectric project, Valle de Antón
Sector: Energy
Current Status: Operating
Estimated Emission Reduction (TCO2eq/year): 5,700
Promoter: Hidro Panamá, S.A.
Contact: Ing. José Luís Saíz
Address: Continental Bank Tower, 20th floor, 50th Street and Aquilino de la Guardia
Phone numbers: (507) 215-7788 / 215-7525
E-mail: jose_luis.saiz@power.alstom.com
Project Location: Valle de Antón, Coclé, Chiriquí
Estimated Cost: US $3,500,000.00

Project Objectives
To provide the province of Coclé with a clean and renewable energy source, through the generation of hydroelectricity in the area of Valle de Antón.

Project Description
The Valle de Antón Hydroelectric project uses the waters of the Antón river; the water enters into the suction building and is redirected to the generator structures located near the community of Valle de Antón, in the Province of Coclé.

It is a hydroelectric plant, with a small dam with a deviation channel. It takes water from the Antón river and redirects it by means of an open channel bed leading to the head chamber, which is connected to the turbines by a forced pipeline. After passing through the turbines, the water returns to the Anton river.

The Valle de Antón Hydroelectric project consist of three stages: The first stage has an installed total capacity of 1.8MW, and initiated operations in January of 2000. The other stages are foreseen to follow, the second towards mid-2002 and the third in 2003.

Project Justification
The project provides a clean and renewable energy source, and has, in addition, improved living standards and employment levels in the area where the project is located. The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
<table>
<thead>
<tr>
<th><strong>Project:</strong></th>
<th>Quebro Hydroelectric project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sector:</strong></td>
<td>Energy</td>
</tr>
<tr>
<td><strong>Current Status:</strong></td>
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<tr>
<td><strong>Estimated Emission Reduction (TCO2eq/year):</strong></td>
<td>10,847</td>
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<tr>
<td><strong>Promoter:</strong></td>
<td>Hidroeléctrica del Sur, S. A.</td>
</tr>
<tr>
<td><strong>Contact:</strong></td>
<td>Roberto S. Rodríguez M.</td>
</tr>
<tr>
<td><strong>Address:</strong></td>
<td>4th Street Curundú and Frangipani Ave.</td>
</tr>
<tr>
<td><strong>Phone numbers:</strong></td>
<td>(507) 225-3133 / 225-3119</td>
</tr>
<tr>
<td><strong>E-mail:</strong></td>
<td><a href="mailto:hidrodelursur@mixmail.com">hidrodelursur@mixmail.com</a></td>
</tr>
<tr>
<td><strong>Project Location:</strong></td>
<td>Rio Quebro, Province of Veraguas</td>
</tr>
<tr>
<td><strong>Estimated Cost:</strong></td>
<td>US $13,100,000.00</td>
</tr>
</tbody>
</table>

**Project Objectives**
To provide the region and the country with a clean and renewable energy source, through the construction of a hydroelectric plant on Quebro river, in the province of Veraguas.

**Project Description**
The Quebro Hydroelectric project utilizes the waters of Quebro river. It involves the construction of a conventional concrete dam 40 meters in height with a machine house at the foot of the dam, in order to create a lake covering approximately 520 hectares.

**Project Justification**
The project will provide a clean and renewable source of energy, as well as improving living standards and employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project’s contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
<table>
<thead>
<tr>
<th><strong>Project:</strong></th>
<th>Paso Ancho Hydroelectric project</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sector:</strong></td>
<td>Energy</td>
</tr>
<tr>
<td><strong>Current Status:</strong></td>
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<td><strong>Estimated Emission Reduction (TCO2eq/year):</strong></td>
<td>25,947</td>
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<tr>
<td><strong>Promoter:</strong></td>
<td>Paso Ancho Hydro Power Corporation</td>
</tr>
<tr>
<td><strong>Contact:</strong></td>
<td>J.C. Lisac</td>
</tr>
<tr>
<td><strong>Address:</strong></td>
<td>Vía Argentina #52, Apt. 10B</td>
</tr>
<tr>
<td><strong>Phone numbers:</strong></td>
<td>(507) 269-4157  (507) 269-1815</td>
</tr>
<tr>
<td><strong>E-mail:</strong></td>
<td><a href="mailto:intercarib@pananet.com">intercarib@pananet.com</a></td>
</tr>
<tr>
<td><strong>Project Location:</strong></td>
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<tr>
<td><strong>Estimated Cost:</strong></td>
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</table>

**Project Objectives**

To provide the region and the country with a clean and renewable energy source, through the construction of a hydroelectric plant on Chiriquí Viejo river, in the province of Chiriquí.

**Project Description**

The Paso Ancho Hydroelectric project consists of a 25-meter-high dam of earth, stone and concrete, on the Chiriquí Viejo river. The dam has been designed to serve as a spillway during high waters.

Formed by a lake that is 2 km long and 200 m wide, the water is directed through a 2-meter-wide concrete tunnel aligned to a machine house located 1,420 m downstream.

The machine house contains 2 units with a capacity of 4.5 MW each. In an average year, energy production will be 75 MWh.

Project construction is estimated to begin in October of 2002, with an estimated duration of 24 months.

**Project Justification**

The project will provide a clean and renewable source of energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project’s contributions include: Conservation of the area’s natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
Project Objectives
To provide the region and the country with a clean and renewable energy source, through the construction of a hydroelectric plant on Chiriquí Viejo river, in the province of Chiriquí.

Project Description
The Monte Lirio H. P. will be constructed on the Chiriquí Viejo river in the province of Chiriquí, and will consist of a generating plant with an installed capacity of 52 MW. The dam will be of the “water edge type with a smaller reservoir”. After passing through the turbines, the water will return to the Chiriquí Viejo river.

Project Justification
The project will provide a clean and renewable source of energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
Project: Pando Hydroelectric project
Sector: Energy
Current Status: Feasibility
Estimated Emissions Reduction (TCO2eq/year): 62,705
Promoter: Electron Investments, S. A.
Contact: Diego Eleta Q.
Address: Floor 13, Aseguradora Mundial Bldg., Ave. Balboa and 41st Street
Phone numbers: (507) 227-0444 / 227-0487
E-mail: deleta@cableonda.net
Project Location: Chiriquí Viejo River, Province of Chiriquí
Estimated Cost: US$. 62,672,000.00

Project Objectives
To provide the region and the country with a clean and renewable energy source, through the construction of a hydroelectric plant on Chiriquí Viejo river, in the province of Chiriquí.

Project Description
The Pando H. P. will be constructed on the Chiriquí Viejo river in the province of Chiriquí, and will consist of a generating plant with an installed capacity of 32 MW. The dam will be of the "water edge type with a smaller reservoir". After passing through the turbines, the water will return to the Chiriquí Viejo river.

Project Justification
The project will provide a clean and renewable source of energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
**Project: Macho de Monte Hydroelectric project**

**Sector:** Energy  
**Current Status:** Operating

**Estimated Emissions Reduction:** 12,500 TCO2eq/year

**Promoter:** Empresa Distribución Eléctrica Chiriquí, S.A.  
**Contact:** Jose Luis Esteban Viejo  
**Address:** Albrook, Bldg. 807, Diógenes De La Rosa Ave.  
**Phone numbers:** 315-7870  315-7696  
**E-mail:** jleviejo@ufpanama.com  
**Project Location:** Bugaba, Chiriquí  
**Estimated Cost:** N/D

**Project Objectives**

To provide the area where the hydroelectric plant is located with a clean and renewable energy source, through the generation of electricity in the region of Cuesta de Piedra, Bugaba, province of Chiriquí.

**Project Description**

The Macho de Monte Hydroelectric project uses the waters of the Piedra river. Water enters the suction building and is redirected to the generating structures located near the town of Cuesta de Piedra, in the district of Bugaba, province of Chiriquí.

It is a hydroelectric plant without a dam, but with a deviation channel. It takes water from the Piedra river and redirects it through an open channel bed to the head chamber which connects to the turbines by means of a forced pipeline. After passing through the turbines, the water returns to the Piedra river.

The Macho de Monte Hydroelectric project consists of three Francis-type hydraulic turbines, with a total installed capacity of 2.800 kW.

The Macho de Monte Hydroelectric plant began operations in the year 1937, and starting on November 1 of 1998, has been operation by the Empresa de Distribución Eléctrica Chiriquí (EDECHI).

In January of 2000, EDECHI began rehabilitation of the plant, through the services of Soluziona Ingeniería, S.A. Said rehabilitation, which required 20 months to complete, involved the installation of two Francis-type turbines with their generators. Improvements were based on the latest technology available, providing greater energy efficiency to the central station.


**Project Justification**

The project will provide a clean and renewable source of energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project's contributions
include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
<table>
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<td>Estimated Emissions Reduction (TCO2eq/year):</td>
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<tr>
<td>Promoter:</td>
<td>Empresa Distribución Eléctrica Chiriquí, S.A.</td>
</tr>
<tr>
<td>Contact:</td>
<td>Jose Luis Esteban Viejo</td>
</tr>
<tr>
<td>Address:</td>
<td>Albrook, Bldgf. 807, Diógenes De La Rosa Ave.</td>
</tr>
<tr>
<td>Phone numbers:</td>
<td>(507) 315-7870 315-7696</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:jleviejo@ufpanama.com">jleviejo@ufpanama.com</a></td>
</tr>
<tr>
<td>Project Location:</td>
<td>Caldera, Chiriquí</td>
</tr>
<tr>
<td>Estimated Cost:</td>
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</tbody>
</table>

**Project Objectives**

To provide the area where the hydroelectric plant is located with a clean and renewable energy source, through the generation of electricity in the region of the community of Quebrada Seca, district of Boquete, province of Chiriquí.

**Project Description**

The Los Algarrobos Hydroelectric project uses the waters of the Algarrobos and Casita de Piedra streams. Water enters the suction building and is redirected to the generating structures located near the community of Quebrada Seca, in the district of Boquete, province of Chiriquí.

It is a hydroelectric plant without a dam, but with a deviation channel. It takes water from the Algarrobos and Casita de Piedra streams and redirects it through an open channel bed to the head chamber which connects to the turbines by means of a forced pipeline. After passing through the turbines, the water flows into the Chiriquí river.

The Los Algarrobos hydrellectric plant consists of two Pelton-type hydraulic turbines, with a total installed capacity of 9.950 kW.

Construction will begin in August of 2002, with the period for completion estimated at 20 months. The plant will begin operations in July of 2004.

**Project Justification**

The project will provide a clean and renewable source of energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project’s contributions include: Conservation of the area’s natural resources and biodiversity, sustainable use of the area’s soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
**Project:** Increase in Generating Capacity of the Central Hidroeléctrica Fortuna

<table>
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<th>Energy</th>
</tr>
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<tr>
<td>Promoter:</td>
<td>Empresa de Generación Eléctrica Fortuna, S.A.</td>
</tr>
<tr>
<td>Contact:</td>
<td>Ing. R. Matas / Ing. Gloria. Manfredo</td>
</tr>
<tr>
<td>Address:</td>
<td>Avenida Balboa, BBVA Bldg., floor 21</td>
</tr>
<tr>
<td>Phone numbers:</td>
<td>(507) 775-5048 / 5161 ; 227-3956 / 1090 / 2410</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:rafael.matas@ege-fortuna.com">rafael.matas@ege-fortuna.com</a>  <a href="mailto:gloria.manfredo@ege-fortuna.com">gloria.manfredo@ege-fortuna.com</a></td>
</tr>
<tr>
<td>Project Location:</td>
<td>Hornitos, district of Gualaca, province of Chiriquí</td>
</tr>
<tr>
<td>Estimated Cost:</td>
<td>US $12,623,000.00</td>
</tr>
</tbody>
</table>

**Project Objectives**

To increase the generating capacity of the Central Hidroeléctrica Fortuna, through the deviation of five streams.

**Project Description**

The project seeks to use the water from five streams, with an average flow of 2.05m3/sec. These waters will be redirected to the lake, thereby increasing the lake's capacity and, in turn, the production of energy (MWh), without the need to increase the installed capacity of the plant or the construction of new infrastructure.

**Project Justification**

The project will increase the use of a clean and renewable source of energy. The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
Project: Bajo Mina Hydroelectric project
Sector: Energy
Current Status: Feasibility, in process of financial contracting
Estimated Emissions Reduction (TCO2eq/year): 95,498
Promoter: La Mina Hydro Power Corp.
Contact: J.C.Lisac
Address: Vía Argentina #52, Apt. 10B
Phone numbers: 269-4157 / 1815
E-mail: intercarib@pananet.com
Project Location: Caizán, Chiriquí
Estimated Cost: US $90,000,000.00

Project Objectives
To provide the region and the country with a clean and renewable energy source, through the construction of a hydroelectric plant on Chiriquí Viejo river, in the province of Chiriquí.

Project Description
The Bajo Mina Hydroelectric plant consists of a 30-meter-high dam of earth, stone and concrete, on the Chiriquí Viejo river. The dam has been designed to serve as a spillway during high waters.

Formed by a lake that is 2 km long and 200 m wide, the water is directed through a 5-meter-wide concrete tunnel aligned to a machine house located 3,600 m downstream.

The machine house contains 3 units with a capacity of 417 MW each. In an average year, energy production will be 260,000 MWh. This energy will be transmitted to the national network by a transmission line of 115 Kv, some 26 km in length.

Project construction is estimated to begin in April of 2002, with an estimated duration of 35 months.

Project Justification
The project will provide a clean and renewable source of energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project’s contributions include: Conservation of the area’s natural resources and biodiversity, sustainable use of the area’s soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
<table>
<thead>
<tr>
<th>Project:</th>
<th>Bayano Hydroelectric project</th>
</tr>
</thead>
<tbody>
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<td>Sector:</td>
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<td>Current Status:</td>
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<td>Estimated Emissions Reduction (TCO2eq/year):</td>
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<tr>
<td>Promoter:</td>
<td>AES Panamá, S.A.</td>
</tr>
<tr>
<td>Contact:</td>
<td>David Sundstrom</td>
</tr>
<tr>
<td>Address:</td>
<td>Banco Continental Tower, Floor 25,</td>
</tr>
<tr>
<td></td>
<td>Nicanor de Obarrio Street and Aquilino de la Guardia</td>
</tr>
<tr>
<td>Phone numbers:</td>
<td>(507) 206-2600 / 2603 / 2612 / 2613</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:Dave.Sundstrom@AES.com">Dave.Sundstrom@AES.com</a>;</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:LuisCarlos.Penaloza@AES.com">LuisCarlos.Penaloza@AES.com</a>;</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Domiluis.Domingez@AES.com">Domiluis.Domingez@AES.com</a>;</td>
</tr>
<tr>
<td>Project Location:</td>
<td>Bayano, Province of Panamá</td>
</tr>
<tr>
<td>Estimated Cost:</td>
<td>US $ 57,773,000.00</td>
</tr>
</tbody>
</table>

**Project Objectives**

The objective of the project is to increase the generating capacity of the Bayano H.P., through the installation of a third unit and the rehabilitation and updating of the units currently in use by the Plant.

**Project Description**

The Bayano hydroelectric project is a 150 MW development, constructed on the Bayano river in the province of Panama, approximately 80 km to the east of Panama City. The project represents 14% of the installed capacity of the SIN. The project consists of the main dam, a spillway and a machine house. Currently, the plant contains two 75 MW units with provision for two additional units. The objective of the project includes the installation of a third unit of 86 MW and the rehabilitation and updating of units 1 and 2, providing an additional capacity of 18 MW.

**Project Justification**

The project will increase the use of a clean and renewable source of energy. The project’s contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
Project: Bonyic Hydroelectric project
Sector: Energy
Current Status: Feasibility, in process of obtaining financing
Estimated Emissions Reduction 49,731 TCO2eq/year
Promoter: Hidroecológca del Teribe, S.A.
Contact: Sr. César Luis Romero, Ing. Domingo Perdomo
Address: Vía España and Elvira Méndez Street, Banco de Boston Tower, Floor 3, Office 301
Phone numbers: (507) 223-3048 / 223-3023
E-mail: caing@cwpanama.net
Project Location: Province of Bocas del Toro
Estimated Cost: US $ 57,000,000.00

Project Objectives
To provide the region and the country with a clean and renewable energy source, through the construction of a hydroelectric plant on Bonyic river, in the province of Bocas del Toro.

Project Description
The project consists of the construction of a 30 MW hydroelectric generating station, including access routes, bridges and a 115 KV transmission line, between Bonyic and Changuinola. The project's interconnection will necessitate the construction of an electric substation in the Bonyic machine house, in order to transform energy from 31.8 KV, to 115 KV.

Project Justification
The project will provide a clean and renewable source of energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
**Project:** Dolega Hydroelectric Project

**Sector:** Energy

**Current Status:** Operating

**Estimated Emissions Reduction (TCO2eq/year):** 17,000

**Promoter:** Empresa Distribución Eléctrica Chiriquí, S.A.

**Contact:** Jose Luis Esteban Viejo

**Address:** Albrook, Bldg. 807, Diógenes De La Rosa Ave.

**Phone numbers:** (507) 315-7870 315-7696

**E-mail:** jleviejo@ufpanama.com

**Project Location:** Dolega, Chiriquí

**Estimated Cost:** US $3,502,832.00

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**Project Objectives**

To provide the area where the hydroelectric project is found, with a clean and renewable source of energy, through the generation of electricity in the district of Dolega in the province of Chiriquí.

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**Project Description**

The Dolega project uses the waters of the Cochea river. Water enters the suction building and is redirected to the generating structures located near the community of Dolega, in the district of Dolega, province of Chiriquí.

It is a hydroelectric plant without a dam, but with a deviation channel. It takes water from the Cochea river and redirects it through an open channel bed to the head chamber which connects to the turbines by means of a forced pipeline. After passing through the turbines, the water flows into the David river. The Dolega hydroelectric plant consists of three Francis-type hydraulic turbines, with a total installed capacity of 3.230 kW.

The Dolega hydroelectric plant began operations in 1937, and beginning on November 1, 1998, is operated by Empresa del Distribución Eléctrica Chiriquí (EDECHI).

In January of 2000, EDECHI began rehabilitation of the plant, through the services of Soluziona Ingeniería, S.A. Said rehabilitation, which required 19 months to complete, involved the construction of a new machine house, where three Francis-type turbines were installed with their generators. Improvements were based on the latest technology available, providing greater energy efficiency to the central station.


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**Project Justification**

The project provides a clean and renewable source of energy, as well as improving employment levels in the area where it is located. The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for mitigating the effects of climate change.
Project:
Cerro Tute Wind Project

Sector:
Energy

Current Status:
Pre – Feasibility

Estimated Emissions Reduction (TCO2eq/year):
56,922

Promoter:
Empresa de Transmisión Eléctrica, S. A.

Contact:
Ing. Ligia Lobo / Ing. Víctor Olmos

Address:
Dept.of Hydrometeorology, Level F, Hatillo Bldg., Ave. Cuba and 36th Street, Calidonia, Panamá

Phone numbers: (507) 227-4856  227-7449

E-mail: energet@sinfo.net

Project Location:
Santa Fé, Province of Veraguas

Estimated Cost:
N/D

Project Objectives
To provide the area of Santa Fe and the country with a clean and renewable source of energy, through the construction of an Wind park in the Cerro Tute area of the province of Veraguas.

General Objectives of the project
To eliminate the barriers which impede and obstruct the development of wind-generated energy production in Panama
To develop strategies which provide incentive to the development of Wind energy in Panama
To establish a data base which will allow the identification of potential sites for the generation of energy by wind
To identify three potential sites for the development of Wind farms
To elaborate a study of technical and economic feasibility for one of these potential sites
To identify local and international sources of financing in order to provide incentive for the private sector to invest in the generation of electricity through clean energies such as Wind energy
To build Panamanian institutional capacity in the techniques of identification, resource evaluation, design, construction, maintenance, financial aspects and investment, for the development of Wind farms in Panama

Project Description
The Cerro Tute Wind Park consists of a compound for the generation of electricity by means of a renewable resource (the wind), which will be located in proximity to the community of Santa Fé, in the province of Veraguas, and will have an installed capacity of 18 MW.

Construction of the compound will require the construction of roads, channels, foundations for generators, and buildings for control.

Project Justification
Worldwide, since the mid-80's, the generation of clean energy by means of the wind has ceased to be considered an experimental form of obtaining non-traditional energy. In the beginning of the 90's, it became a clean and commercially competitive form of generating electricity.
The need to preserve the environment and the imminent urgency to be less dependent on petroleum, forces us to search for clean energy sources which can be exploited as an alternative for electrical generation, to the extent that at least a portion of the country's energy needs can be met in this way.

According to previous studies on the Determination of Wind Potential in Panama (Master Plan for Renewable Resources - 1983 - University of Delaware), our country encompasses regions with excellent wind flow (Atlantic coast, Central mountain range) which could provide the country with from 50 to 300 MW of energy.

In order to turn this potential resource into reality, a series of aspects are being developed, such as: The detailed and punctual study of this resource, the true situation of this technology as a competitive source of electrical generation, the definition of its participation within the schemas which have already been predetermined for national generation, the determination of potential sites for the development of these projects, and the identification of obstacles which have impeded the development of this technology.

The project will provide a new source of clean and renewable energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution.
### Project: Design and Construction of the Blue Line of the Light Rail Train

#### Sector: Transportation  
**Current Status:** Design  
**Estimated Emission Reduction (TCO2eq/year):** N / D  
**Promoter:** Government of Panama - Ministry of Public Works (MOP) - BCEOM  
**Contact:** Ing. Alvaro Juliao Gelonch - Ing. Héctor Jiménez  
**Address:** Special projects MOP - Curundu  
**Phone numbers:** 207-9446  207-9420  
**E-mail:** hjimenez@mop.gob.pa  
**Project Location:** Province of Panama  
**Estimated Cost:** US $ 200,000,000.00

### Project Objectives
The urgent need to find transportation solutions stems from the alarming increase in recent years of vehicles in Panama City, which has resulted in the extreme congestion of its main avenues during the greater part of the day. Under these conditions, Panamanians are spending more and more of their day in cars or buses, resulting in more air pollution, noise, stress and physical wear, as well as causing general deterioration of the environment and a declining quality of life.

The MOP carried out a study which demonstrated the possibility of implanting a mass transit system with the objective of decongesting the city’s streets and providing a faster and more efficient mode of transportation within the metropolitan area. The system recommended by the feasibility study is a Light Rail Train along two main avenues (Ave. España and Simón Bolívar). Based on the results of the "FEASIBILITY STUDY FOR A MASS TRANSIT SYSTEM IN THE METROPOLITAN AREA OF PANAMA CITY" (ESTPUM), the Panamanian government decided to initiate the design and construction phase of the Blue Line of the Light Rail Train, with the capacity to transport up to 134,500 passengers daily.

### Project Description
The Light Rail Train project consists of the design and construction of the Blue Line of the Light Rail Train, with the capacity to transport up to 134,500 passengers daily.

### Project Justification
The light rail train system will be exploited by a company which will be in charge of management and operations. Its market will be those passengers who currently circulate in the selected area, numbering around 134,500, according to data from the ESTPUM study. Upon implementation of the system, it is expected that a certain percentage of current users of private vehicles will instead use the light rail train system in order to get around. The project will permit reduction of air pollution, noise, stress and physical wear on individuals. The project is compatible with actions for the mitigation of the effects of climate change. The project will use electricity as its energy source, and will, in addition, improve employment levels in areas adjacent to the train’s route.
### Project:
**Rural Wind Project for Battery Recharge**  (2 to 5 Kw)

### Sector:
Energy

### Current Status:
Project Idea

### Estimated Emission Reduction (TCO2eq/year):
N / A

### Promoter:
Empresa de Transmisión Eléctrica, S. A.

### Contact:
Ing. Ligia Lobo / Ing. Víctor Olmos

### Address:
Dept. of Hydrometeorology, Level F, Hatillo Bldg. Ave. Cuba and 36th Street, Calidonia, Panamá

### Phone numbers:
227-4856  227-7449

### E-mail:
energet@sinfo.net

### Project Location:
Republic of Panama

### Estimated Cost:
N / A

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### Project Objectives
To provide rural areas with a clean and renewable source of energy, through the installation of Wind generators and battery banks for the supply of electricity to said areas.

### General Objectives of the project
- To eliminate the barriers which impede and obstruct the development of wind-generated energy production in Panama
- To develop strategies which provide incentive to the development of Wind energy in Panama
- To elaborate a study of technical and economic feasibility for one of these potential sites
- To identify local and international sources of financing in order to provide incentive for the private sector to invest in the generation of electricity through clean energies such as Wind energy
- To build Panamanian institutional capacity in the techniques of identification, resource evaluation, design, construction, maintenance, financial aspects and investment, for the development of Wind farms in Panama

### Project Description
The project entails the installation of small electric generators which will use a renewable resource (the wind) and battery banks, for the supply of electricity in rural areas.

### Project Justification
Worldwide, since the mid-80's, the generation of clean energy by means of the wind has ceased to be considered an experimental form of obtaining non-traditional energy. In the beginning of the 90's, it became a clean and commercially competitive form of generating electricity.

The need to preserve the environment and the imminent urgency to be less dependent on petroleum, forces us to search for clean energy sources which can be exploited as an alternative for electrical generation, to the extent that at least a portion of the country's energy needs can be met in this way.

According to previous studies on the Determination of Wind Potential in Panama (Master Plan for Renewable Resources - 1983 - University of Delaware), our country encompasses...
regions with excellent wind flow (Atlantic coast, Central mountain range) which could provide the country with from 50 to 300 MW of energy.

In order to turn this potential resource into reality, a series of aspects are being developed, such as: The detailed and punctual study of this resource, the true situation of this technology as a competitive source of electrical generation, the definition of its participation within the schemas which have already been predetermined for national generation, the determination of potential sites for the development of these projects, and the identification of obstacles which have impeded the development of this technology.

The project will provide a new source of clean and renewable energy, and will contribute to: Conservation of the area’s natural resources and biodiversity, sustainable use of the area’s soil, and reduction of air pollution. The project is compatible with actions for the mitigation of the effects of climate change.
Project: Hornitos Wind Park  
Sector: Energy  
Current Status: Basic Engineering Studies and Environmental Impact Studies  
Estimated Emission Reduction (mt CO2eq/year): 101,000  
Promoter: Empresa Distribución Eléctrica Metro-Oeste, S.A.  
Contact: Jose Luis Esteban Viejo  
Address: Albrook, Bldg. 807, Diógenes De La Rosa Ave.  
Phone numbers: 315-7870  315-7696  
e-mail: jleviejo@ufpanama.com  
Project Location: Hornitos, Chiriquí  
Estimated Cost: US $26,100,670.00

Project Objectives
To provide the region and the country with a clean and renewable source of energy, through the construction of an Wind park in the Hornitos region of the province of Chiriquí.

Project Description
The Hornitos Wind Park consists of a compound for the generation of electricity by means of a renewable resource (the wind). It will be located in proximity to the town of Calabazal, on top of the hills known as La Gianera, Barrial and Guabal, in the province of Chiriquí, district of Gualaca, and will have in installed capacity of 30,35 MW.

Construction of the compound will require the construction of roads, channels, foundations for generators, and buildings for control.

The Hornitos Wind Park will have 46 wind generators with a unit capacity of 660 kW, based on the latest technology in order to achieve the highest grade of efficiency in using the wind resource. The area of land to be used directly by the project will not exceed 25 hectares; adjacent lands may put to other uses.

The estimated construction period for the project is 18 months, and operations are estimated to begin in June of 2004.

Project Justification
The project will provide a new source of clean and renewable energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project’s contributions include: Conservation of the area’s natural resources and biodiversity, sustainable use of the area’s soil, and reduction of air pollution. The project is compatible with actions for the mitigation of the effects of climate change.
Project: La Miel Wind Project  
Sector: Energy  
Current Status: Pre – Feasibility  
Estimated Emission Reduction (mt CO2eq/year): 63,247  
Contact: Ing. Ligia Lobo  Ing. Víctor Olmos  
Address: Dept. of Hydrometeorology, Level F, Hatillo Bldg. Ave. Cuba and 36th Street, Calidonia, Panamá  
Phone numbers: (507) 227-4856  227-7449  
e-mail: energet@sinfo.net  
Project Location: Province of Los Santos  
Estimated Cost: N / A

Project Objectives  
To provide the province of Los Santos and the country with a clean and renewable source of energy, through the construction of an Wind park in the La Miel region of the province of Los Santos

General Objectives of the project  
To eliminate the barriers which impede and obstruct the development of wind-generated energy production in Panama  
To develop strategies which provide incentive to the development of Wind energy in Panama  
To establish a data base which will permit the identification of potential sites for the generation of energy by wind  
To identify three potential sites for the development of Wind farms  
To elaborate a study of technical and economic feasibility for one of these potential sites  
To identify local and international sources of financing in order to provide incentive for the private sector to invest in the generation of electricity through clean energies such as Wind energy  
To build Panamanian institutional capacity in the techniques of identification, resource evaluation, design, construction, maintenance, financial aspects and investment, for the development of Wind farms in Panama

Project Description  
The La Miel Wind Park consists of a compound for the generation of electricity which will use a renewable resource (the wind), to be located in proximity to the community of La Miel, in the province of Los Santos, with an installed capacity of 20MW.

Construction of the compound will require the construction of roads, channels, foundations for the generators and buildings for control.

Project Justification  
Worldwide, since the mid-80's, the generation of clean energy by means of the wind has ceased to be considered an experimental form of obtaining non-traditional energy. In the beginning of the 90's, it became a clean and commercially competitive form of generating electricity.
The need to preserve the environment and the imminent urgency to be less dependent on petroleum, forces us to search for clean energy sources which can be exploited as an alternative for electrical generation, to the extent that at least a portion of the country's energy needs can be met in this way.

According to previous studies on the Determination of Wind Potential in Panama (Master Plan for Renewable Resources - 1983 - University of Delaware), our country encompasses regions with excellent wind flow (Atlantic coast, Central mountain range) which could provide the country with from 50 to 300 MW of energy.

In order to turn this potential resource into reality, a series of aspects are being developed, such as: The detailed and punctual study of this resource, the true situation of this technology as a competitive source of electrical generation, the definition of its participation within the schemas which have already been predetermined for national generation, the determination of potential sites for the development of these projects, and the identification of obstacles which have impeded the development of this technology.

The project will provide a new source of clean and renewable energy, as well as improving employment levels in the area where it is to be developed, in addition to permanent infrastructure (roads, electric service, communications, etc.) The project's contributions include: Conservation of the area's natural resources and biodiversity, sustainable use of the area's soil, and reduction of air pollution. The project is compatible with actions for the mitigation of the effects of climate change.
CDM PROJECT PROFILE IN THE NON-ENERGY SECTOR

Project: Reforestation of the Chucunaque River upper basin
Sector: Forest
Current Status: Project Idea
Estimated Emission Reduction (mt CO2eq/year): N / A
Promoter: Dobboyala Foundation
Contact: Eligio Alvarado Paredes
Address: Urb. Herbruher, House 13 B
Phone numbers: (507) 261-7229  261-6347   261-7229
e-mail: doabbo@dobboyala.org
Project Location: Chucunaque River, Province of Darién
Estimated Cost: N / A

Project Objectives
Conservation of the biodiversity of the Chucunaque River upper basin.

Project Description
The Project entails reforestation of 6,000 ha in the upper basin of the Chucunaque River, with trees native to the area.

Project Justification
Development of the project will serve to avoid deterioration of the region's biodiversity, to make better sustainable use of the soil, and to protect the river's upper basin. Also, employment will be generated both directly and indirectly in the region, permitting a reduction in poverty in the area where the project is to be carried out.
**Project:**
Reforestation of areas surrounding and within Cerro Patacón sanitary landfill

**Sector:**
Forest

**Current Status:**
Project Idea

**Estimated Emission Reduction (mt CO2eq/year):**
N / A

**Promoter:**
Mayor of Panama City

**Contact:**

**Address:**
Office of Municipal Sanitation, Carrasquilla

**Phone numbers:**
229-3445  229-3434  ext. 127

**E-mail:**
bethzaidavalverde@hotmail.com

**Project Location:**
Panama City, Province of Panama

**Estimated Cost:**
N / A

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**Project Objectives**
Reforestation of Cerro Patacon sanitary landfill area.

**Project Description**
The project entails reforestation of the areas surrounding and within Cerro Patacon sanitary landfill.

**Project Justification**
Development of the project will serve to avoid deterioration of the region's biodiversity, to make better sustainable use of the soil, to reduce air pollution and to protect the area adjacent to Cerro Patacon sanitary landfill. The project is compatible with actions for the mitigation of the effects of climate change.
Project: Reforestation of 1,250 ha in Estí Hydroelectric Project area

Sector: Forest

Current Status: Project Idea

Estimated Emission Reduction (mt CO2eq/year): N/A

Promoter: AES Panamá

Contact: David Sundstrom

Address: Banco Continental Tower, 25th floor, Nicanor de Obarrio and Aquilino de la Guardia Streets (507) 206-2600 / 206-2603 (507) 206-2612 / 206-2613

Phone numbers: Dave.Sundstrom@AES.com; LuisCarlos.Penaloza@AES.com; Domiluis.Domingez@AES.com

E-mail:

Project Location: Gualaca, province of Chiriquí

Estimated Cost: N/A

Project Objectives
Conservation of biodiversity in the region where the Estí Hydroelectric Project is being constructed.

Project Description
The project entails reforestation of 1,250 ha in the area where the Estí Hydroelectric Project is being constructed, with trees native to the area.

Project Justification
Development of the project will serve to avoid deterioration of the region’s biodiversity, to make better sustainable use of the soil, and to protect the region adjacent to the Estí Hydroelectric Project. Also, employment will be generated both directly and indirectly in the region, permitting a reduction in poverty in the area where the project is to be carried out. The project contributes to the conservation of the region’s natural resources and reduces air pollution. The project is compatible with activities for the mitigation of the effects of climate change.
<table>
<thead>
<tr>
<th>Project:</th>
<th>Agroforestry and Natural Pasture Systems in the Buffer Area of El Copé National Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector:</td>
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</tr>
<tr>
<td>Current Status:</td>
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<td>Estimated Emission Reduction (mt CO2eq/year):</td>
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</tr>
<tr>
<td>Promoter:</td>
<td>San Felix Agroforestry</td>
</tr>
<tr>
<td>Contact:</td>
<td>Félix Graell   Edwin Graell</td>
</tr>
<tr>
<td>Address:</td>
<td>Las Barretas, La Pintada, Province of Coclé</td>
</tr>
<tr>
<td>Phone numbers:</td>
<td>(507) 239-4386  220-3653</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:rgraellr@avaya.com">rgraellr@avaya.com</a></td>
</tr>
<tr>
<td>Project Location:</td>
<td>Province of Coclé</td>
</tr>
<tr>
<td>Estimated Cost:</td>
<td>N / A</td>
</tr>
</tbody>
</table>

**Project Objectives**
To conserve the biodiversity of the area, and to avoid deforestation of the buffer area of El Copé National Park.

**Project Description**
The Project entails reforestation of the buffer area of El Copé National Park, with trees native to the area.

**Project Justification**
Development of the project will serve to avoid deterioration of the region's biodiversity, to make better sustainable use of the soil, and to protect the natural forests of El Copé National Park. Also, employment will be generated both directly and indirectly in the region, permitting a reduction in poverty in the area where the project is to be carried out. The project contributes to the conservation of the region's natural resources and reduces air pollution. The project is compatible with activities for the mitigation of the effects of climate change.
<table>
<thead>
<tr>
<th>Project:</th>
<th>Reforestation of 200 ha in the Bayano Hydroelectric Project basin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector:</td>
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</tr>
<tr>
<td>Current Status:</td>
<td>Project Idea</td>
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<tr>
<td>Estimated Emission Reduction (mt CO2eq/year):</td>
<td>N/A</td>
</tr>
<tr>
<td>Promoter:</td>
<td>AES Panamá</td>
</tr>
<tr>
<td>Contact:</td>
<td>David Sundstrom</td>
</tr>
<tr>
<td>Address:</td>
<td>Banco Continental Tower, 25th Floor, Nicanor de Obarrio and Aquilino de la Guardia Streets</td>
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<tr>
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<td>E-mail:</td>
<td><a href="mailto:Dave.Sundstrom@AES.com">Dave.Sundstrom@AES.com</a>; <a href="mailto:LuisCarlos.Penaloza@AES.com">LuisCarlos.Penaloza@AES.com</a>; <a href="mailto:Domiluis.Domingez@AES.com">Domiluis.Domingez@AES.com</a>;</td>
</tr>
<tr>
<td>Project Location:</td>
<td>Bayano, Province of Panamá</td>
</tr>
<tr>
<td>Estimated Cost:</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Project Objectives**
Conservation of biodiversity in the Bayano Hydroelectric Project basin.

**Project Description**
The project entails reforestation of 200 ha in the Bayano Hydroelectric Project basin, with trees native to the area.

**Project Justification**
Development of the project will serve to avoid deterioration of the region's biodiversity, to make better sustainable use of the soil, and to protect the Bayano Hydroelectric Project basin. Also, employment will be generated both directly and indirectly in the region, permitting a reduction in poverty in the area where the project is to be carried out. The project contributes to the conservation of the region’s natural resources and reduces air pollution. The project is compatible with activities for the mitigation of the effects of climate change.
<table>
<thead>
<tr>
<th>Project:</th>
<th>Treatment of Residual Water and Solid Waste from the Central Azucarera La Victoria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sector:</td>
<td>Waste</td>
</tr>
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<td>Current Status:</td>
<td>Project Idea</td>
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<tr>
<td>Estimated Emission Reduction (mt CO2eq/year):</td>
<td>N / A</td>
</tr>
<tr>
<td>Promoter:</td>
<td>Central Azucarera La Victoria, S. A.</td>
</tr>
<tr>
<td>Contact:</td>
<td>Buenaventura Juárez</td>
</tr>
<tr>
<td>Address:</td>
<td>La Raya de Santa María, Santiago, Province of Veraguas</td>
</tr>
<tr>
<td>Phone numbers:</td>
<td>(507) 959-0444 959-0422 959-0404</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:calvisa@cwpanama.net">calvisa@cwpanama.net</a></td>
</tr>
<tr>
<td>Project Location:</td>
<td>La Raya de Santa María, Santiago, Province of Veraguas</td>
</tr>
<tr>
<td>Estimated Cost:</td>
<td>N / A</td>
</tr>
</tbody>
</table>

Project Objectives
To avoid contamination of the soil in the area in which the Central Azucarero La Victoria is located.

Project Description
The project involves treatment of residual waters and solid waste proceeding from the Central Azucarera, in order to avoid contamination of the soil and the sources of surface water in the area adjacent to the Central.

Project Justification
By treating residual waters and solid waste proceeding from the Central Azucarera, the project will serve to avoid deterioration of the region's biodiversity, to make better sustainable use of the soil, and to protect the area's surface water sources. Also, employment will be generated both directly and indirectly in the region, permitting a reduction in poverty in the area where the project is to be carried out.
Project: Carbon capture through the cultivation of hardwood trees
Sector: Forest
Current Status: Project Idea
Estimated Emission Reduction (mt CO2eq/year): N / A
Promoter: Veraguas Reforester's Association (ASOREVE)
Contact: Yolanny Jimenez de Pinzon  Sebastián A. Tejedor
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Project Location: Province of Veraguas
Estimated Cost: N / A

Project Objectives
To conserve biodiversity in the province of Veraguas, and to reduce the stress on natural forests.

Project Description
The Project involves reforestation of 800 ha in the province of Veraguas (998% Teak and 2% African Mahogany and Pine)

Project Justification
Development of the project will serve to avoid deterioration of the region's biodiversity, to make better sustainable use of the soil, and to protect the province. Also, employment will be generated both directly and indirectly in the region, permitting a reduction in poverty in the area where the project is to be carried out. The project contributes to the conservation of the region's natural resources and reduces air pollution. The project is compatible with activities for the mitigation of the effects of climate change.