

---

Project Idea Note

Hydroelectric Project  
Coca Codo Sinclair



**A. Basic Project description**

<b>Name of Project and date submitted</b>	PROYECTO HIDROELÉCTRICO COCA CODO SINCLAR
<b>Technical Project summary</b> <i>Maximum 1 page</i>	
<b>Project objective</b>	<ul style="list-style-type: none"> <li>• To build a Hydroelectric Central/Plant with a nominal power of 1.500 MW in order to produce an annual energy average of 8.631 GWh.</li> <li>• To deliver the generated energy to the Interconnected National System.</li> <li>• To replace thermoelectric energy, which derives from fossil fuels, with renewable hydroelectric energy</li> </ul>
<b>Technical description of the project and the proposed activities</b>	<p>It will be a run-of-the-river hidrostation that will take advantage of the discharges of both, River Quijos and River Salado, which in turn make up the Coca River. The maximum derived flow is 222 m<sup>3</sup>/s with the following construction and development work.</p> <ul style="list-style-type: none"> <li>• Run-of-the-river intake works with two slopes with a maximum unloading/release capacity of 7,500 m<sup>3</sup>/s.</li> <li>• External dredge with 6 rooms or cameras.</li> <li>• Conductive tunnel with a longitude of 24.82 km and an excavation diameter of 9.1 m completely made up of concrete.</li> <li>• Compensating reservoir with usable volume of 800.000m<sup>3</sup>.</li> <li>• The ditch or channel to create the compensating reservoir with a concrete screen of the following dimensions. Height 53.5 m and 320,000 m<sup>3</sup>.</li> <li>• Two pressurized pipes with a diameter of 5,80 and a longitude of 1,900 m and a vertical well of 450m.</li> <li>• Access path to the Powerhouse. Longitude 495 m, wide 6.50 m and height 7.50 m.</li> <li>• Underground powerhouse 26 x 50 x 192 m, with 8 generating units which will be equipped with Pelton type turbines of 187.5 MW each.. In addition, a parallel cavern in order to house the transformers and the sub-station with the following dimensions de 16.50 x 33 x 192 m.</li> <li>• A horseshoe shaped renderer tunnel with an internal diameter of 9.00 m and 660 m in length.</li> <li>• A cable gallery with 530 m in length</li> <li>• Control building, workshops and equipment and transmission lines exit yard for the transmission system at 500 kV, in a 175 m x 41 m area.</li> </ul>
<b>Technology to be employed</b>	<p>This hydroelectric Project will use a natural waterfall of 618.4 m in length and a maximum regulated flow of water of 278 m<sup>3</sup>/s. This Project plans to reach and develop in one stage an installed power of 1.500 MW (annual plant factor average 0.67)</p>

<b>Owner and/or project developer</b>		<i>If the owner and the project developer NOT are the same, please fill in both names and addresses separately.</i>
<b>Name</b>	Empresa Pública Estratégica Hidroeléctrica Coca Codo Sinclair, COCASINCLAIR E.P.	
<b>Organizational category</b>	Public	
<b>Other function(s) of the project developer in the project</b>	None	
<b>Summary of the relevant experience of the project developer</b>	<ul style="list-style-type: none"> <li>The Project will be developed through an EPC type contract with the highly experienced constructor Sinohydro of China.</li> </ul>	
<b>Address</b>	Av. De los Shyris N35-71 y Suecia, Edificio Argentum, piso 14, Quito, Ecuador	
<b>Contact Person</b>	Ing. Luciano Cepeda V. CEO	
<b>Telephone / fax</b>	593-2 2264492 / 5932 3332614 ext. 104	
<b>E-mail /webpage</b>	<a href="mailto:luciano.cepeda@cocasinclair.com">luciano.cepeda@cocasinclair.com</a> / <a href="http://www.cocasinclair.com">www.cocasinclair.com</a> Ec. Pablo Patiño, MBA Email <a href="mailto:pablo.patino@cocasinclair.com">pablo.patino@cocasinclair.com</a> 593 2 3814300 ext. 122	

<b>Type of project</b>	
<b>Green House Gas (GHG) targeted</b>	CO <sub>2</sub>
<b>CDM Sectoral scope</b>	Energy Industries (Renewable)
<input type="checkbox"/> Energy production	<input checked="" type="checkbox"/> Renewable energy, except for biomass projects
<b>Project location</b>	
<b>Region</b>	South America
<b>Country</b>	Ecuador
<b>Region / Province</b>	Amazonía / Provincias de Napo y Sucumbios /Rainforest
<b>City</b>	El Chaco / Lumbaqui
<b>Brief description of location</b>	It is located between the towns of El Chaco and Gonzalo Pizarro in the provinces of Napo and Sucumbios. It makes use of the water of the Rio Coca at the junction of the Rio Quijos and Rio El Salado.
<b>Expected schedule</b>	
<b>Earliest project start date</b>	Late 2015
<b>Estimate of time required before becoming operational after approval of the PIN</b>	5.5 years
<b>Project life span</b>	50 years

<b>Expected first year of Certified Emission Reduction (CER)</b>	2016
<b>Current status or phase of the project</b>	<ul style="list-style-type: none"> <li>• The conceptual re-design to generate 1.500 MW has been completed. These studies allowed the company to hired EPC to develop the basic engineering, procurement, equipment acquisition, the installation and implementation of the equipment.</li> <li>• The construction of the Access path to the Powerhouse is still in progress and registers a completion percentage of 98%. This construction has the definitive environmental license.</li> <li>• All the permits to use the water and permission for provisional electric generation has been obtained.</li> <li>• All the environmental licenses have been obtained.</li> </ul>
<b>Ecuador and Kyoto</b>	<ul style="list-style-type: none"> <li>• Ecuador ratified the UNFCCC on November 7th, 1994 (R.O No. 562)</li> <li>• Ecuador ratified The Kyoto Protocolo on December 20, 1999 (R.O No. 1588)</li> </ul>

## B. Expected environmental and social benefits

<b>Estimated Greenhouse Gases abated /CO<sub>2</sub> Sequestered (in metric tons of CO<sub>2</sub> equivalent)</b>	<p>Equivalent Metric CO<sub>2</sub> units per year [4,552,852/year]</p> <p>10 yr. Average: <b>4,552,852</b> ton CO<sub>2</sub>eq/yr  Total amount during 50 yrs: 241,896,721 ton CO<sub>2</sub>  <b>Average 10 years : 45,528,525 ton CO<sub>2</sub></b></p>
<b>Baseline scenario (before the project)</b>	<p><i>Which emissions will the proposed MDL replaced?</i></p> <p>The total effective power in the interconnected National System is 4,229.59 MW made up of 47.97% from Hydroelectric plants, 39.72% from thermoelectric plants and 12.41% from interconnection with Colombia and Perú.</p> <p>The above mentioned sources contributed with an installed capacity of gross energy which on 2008 was 16,679.47GWh divided in the Interconnected National System as follows, 67,61% (11,276.45 GWh) from Hydraulic source, 29,39% (4,902.84 GWh) from the thermal plant and 3% (500.16 GWh) from energy imports from Colombia and Perú.</p> <p>As soon as the Project Coca Codo Sinclair starts operating (and the expansion plan followed and completed) the generating composition (energetic matrix) will change to 88% Hydroelectric, 11% Thermal and 1% from energy imports.</p> <p><i>How would the future look without this Project (CocaSinclair)?</i></p> <p>Without the construction of this Project, the energy matrix would keep its current level and distribution. The Thermoelectric generation would continue to have a high participation in the energy and power supply. In addition, it would be highly probable an increment on the dependency from energy imports from Colombia and Peru.</p>

	<p><i>What are the obstacles that this Project faces? (financial, on the market, legal, institutional and technological). What are the solutions to these obstacles ?</i></p> <p><u><i>Finacial</i></u></p> <p>The Project does not have the full correspondent financial backing, currently. The company has an agreement between the Ecuadorian Government and the EXIMBANK from China for financing 85% of the EPC Contract.</p> <p><u><i>On the Market</i></u></p> <p>Due to the considerable increase on the demand of energy in Ecuador, the prepared studies do not forecast issues on the allocation of the production for the Project. These studies include an operative simulation of the Project on the Electric wholesale market for the 2008-2020 period, which was conducted by CENACE (Corporación Centro Nacional de Control de Energía).</p> <p><u><i>Legal</i></u></p> <p>The legal frame of the electric sector is being modified in order to benefit the Project, especially on the functionality of the market, the participants, tariffs, and different contractual models for the sale of energy and power.</p> <p><u><i>Organizational</i></u></p> <p>COCASINCLAIR has chosen to do an EPC contract with Sinohydro of China.</p> <p>The language is a barrier between the Contractor, local subcontractors and employees during the construction. The Contractor must provide enough technical Spanish - Chinese translators.</p> <p><u><i>Technological</i></u></p> <p>Considering global warming a reality, there is uncertainty about the registered river flow to date in the future. There might be geological risks in underground construction that could have an impact of the execution schedule.</p> <p>However, the contractor will have highly experienced engineers at medium and high levels.</p> <p>The risk of construction flaws and initial operation problems will be minimized with the EPC, since Sinohydro has the highest qualifications and the Supervision team of COCASINCLAIR will have the best local and international professionals.</p>
<i>Maximum ½ page in total</i>	
<p><b>Global benefits</b></p>	<ul style="list-style-type: none"> <li>• This Project will contribute to the reduction of CO2 emissions with 4,837,934 tons each year, displacing the production of thermoelectric energy to satisfy the demand growth.</li> <li>• Because it is a run-of-the-river central, it does not include a high dam, avoiding methane emissions.</li> <li>• Given that most of the construction will be underground, the Project will not cause deforestation, allowing the conservation of the forest and biodiversity.</li> </ul>

<p><b>Local benefits</b></p>	<ul style="list-style-type: none"> <li>• The Project will contribute to the conservation of natural resources and the rivers where it takes the water from. Furthermore it will offer the communities the possibility to develop ecotourism, where the profitability lies on taking care of the natural conditions and its stage beauty.</li> <li>• The strict conservation of the ecological flow of the river and the restitution of the water to the same river (Coca) after its use for electric generation, guarantees the return of the water to the flow of the river.</li> </ul>
<p><b>Environmental impact study</b></p>	<ul style="list-style-type: none"> <li>• The Project has an Environmental Impact Study, which was the base for obtaining the Environmental Licenses.</li> <li>• The definitive environmental impact study incorporates an Environmental Management Plan directed to achieve the minimum affectation of the areas where the Project is being built, and also the conservation of the natural resources of the forest. This is very important for the conservation of water resources.</li> </ul>
<p><b>Which guidelines will be applied?</b></p>	<ul style="list-style-type: none"> <li>• The regulating framework of the Project is the Environmental Management Law, created in 1999 and establishes the procedures and actions that must be followed in a Project of this nature in order to obtain the required licenses. It also establishes the role of the Ministry of Environment as the regulating entity of the environmental policies of the country.</li> <li>• The Electric Sector Law must also be taken into account for this Project, specially the article 3, which stipulates regulations for all the actors involved in the generation, transmission and distribution of electric energy concerning environmental conservation.</li> </ul>
<p><b>Socioeconomic benefits from the project</b> <span style="float: right;"><i>Maximum ½ page in total</i></span></p>	
<p><b>Benefits at the national / sub regional level</b></p>	<ul style="list-style-type: none"> <li>• At the national level, the benefits are related to covering the energy demand, substituting the import of electricity and regulating the electricity tariffs to favor the living conditions of the low income population.</li> <li>• The transition to renewable energy will reduce the negative environmental impacts of using fossil fuels.</li> <li>• The river basins management of the hydric complex involved in the Project will encourage the conservation and sustainable economic development activities with many communities located in the region.</li> <li>• An average of 4000 direct jobs and an estimate of 15000 indirect jobs will be created.</li> </ul>
<p><b>Benefits at local level</b></p>	<ul style="list-style-type: none"> <li>• The execution of the different building works will allow the use of qualified and non qualified local labor force, in addition to the use of local services such as transportation and food supply.</li> <li>• The social responsibility plan considers the specific support to projects that favor the long term development processes, such as ecotourism and health and education infrastructure.</li> <li>• Creation of micro businesses.</li> <li>• Improvement of communications.</li> <li>• Main and secondary roads infrastructure.</li> </ul>

<b>Social impact study</b>	<ul style="list-style-type: none"> <li>In accordance with the regulation for the application of the social participation mechanisms established in the Environmental Management Law, issued through Executive Decree No. 1040 on May 8<sup>th</sup> 2008, public audiences were conducted to present the Terms of Reference of the Definitive Environmental Impact Study (DEIS) in the two towns where the Project is located. The observations were incorporated on the final document that was authorized by the national environment authority (DNA).</li> <li>The local communities and authorities have a positive posture towards the Project, they back up its execution considering its strategic importance for the country and they are receptive towards the economic development this Project represents for them. Therefore, no negative social impact can be anticipated.</li> </ul>
<b>Which guidelines will be applied?</b>	<ul style="list-style-type: none"> <li>The Environmental Management Plans derived from the DEIS will be applied systematically with the participation of the local communities.</li> </ul>
<b>Environmental strategy / priorities of the Host country</b>	<ul style="list-style-type: none"> <li>The main environmental strategy is based on the comprehensive conservation of all the influence area of the Project, including rivers, forests, biodiversity and adequate conservation</li> </ul>

## Finance

Total project cost estimate					
Development costs	US\$	54,509,895			
Construction/installation costs	US\$	1,979,700,000			
Other costs	US\$	636,498,805			
Total project costs	US\$	2,670,708,700			
Sources of finance to be sought or already identified					
Equity	US\$	987,963,700	COCASINC LAIR EP	37%	committed <input checked="" type="checkbox"/> / negotiation <input type="checkbox"/>
Debt – Long term	US\$	1,682,745,000	EXIMBANK CHINA	63%	committed <input type="checkbox"/> / negotiation <input type="checkbox"/> committed <input type="checkbox"/> / negotiation <input type="checkbox"/>
Debt – Short term					committed <input type="checkbox"/> / negotiation <input type="checkbox"/> committed <input type="checkbox"/> / negotiation <input type="checkbox"/>
Non identified	A leverage of 25% through CERs is being considered				
CDM contribution (complimentary earnings on the sale of CERs)					
Average reduction a year	4,552,852 ton CO <sub>2</sub>				
Indicative price on one "CER"	€ 6 / ton CO <sub>2</sub>	€ 9 / ton CO <sub>2</sub>	€ 12 / ton CO <sub>2</sub>		
Sale of CERs until 2012					
CDM contribution if certified 7 years	€ 382,439,589	€ 573,659,384	€ 764,879,178		

<b>CDM contribution if certified 10 years</b>	€ 273,171,120	€ 409,756,680	€ 546,342,240
<b>CERs sold in advance</b>	15 to20%		
<b>Basic estimation on profitability</b>			
<b>Internal return rate (IRR)</b>	If the CDM project are financed, please state the financial return rate with and without the sale of the CERs		
<b>IRR without CERs</b>	7,78%		
<b>IRR with CERs, until 2012</b>			
<b>IRR with CERs, 7 years period</b>	8,62%	9,04%	9,46%
<b>IRR with CERs, 10 years period</b>	8,50%	8,88%	9,25 %