
Project Idea Note

Jondachi Hydroelectric Project (12 MW)



Intake's site for the Jondachi Hydroelectric Project
(Jondachi River)

This PIN has been developed by the project developer, with the support of the CDM Promotion Office – CORDELIM.

A. Basic Project description

Name of Project and date submitted	Jondachi Hydroelectric Project (JHP)
Technical project summary	
Project objective	<ul style="list-style-type: none"> The purpose of the project is, through a sustainable way, to take advantage of the natural water resources provided by the tropical forest in the Amazon Basin. The project will guarantee revenues for local public institutions and the indigenous organizations, and aim at preserving natural areas. To generate electricity by selling it to the national grid: the "National Interconnected System" (SNI).
Technical description of the project and the proposed activities	<p>The Jondachi Hydroelectric Project is a run-of-river hydroelectric Project located in Ecuador (Province of Napo). The project will have an installed capacity of 12 MW and produce an annual average generation of 87,70 GWh.</p> <p>The JHP is the first project in a group that include others small hydroelectric plants, which will be developed in the area. Projects that will contribute to the socio-economic development of the region, and provide electricity to remote communities.</p> <p>The project will take advantage of the Jondachi River. The hydroelectric generation of the JHP will be achieved by a run-of-river hydroelectric plant which, Consequently, will not have a reservoir.</p> <p>The diversion dam consists of a 40-meter long concrete structure that will divert water to a sand collecting structure followed by a 1.400-cubic meter surge tank. A tunnel 2.400 m long will carry the water to the penstock which is 300 m long. The powerhouse will be equipped with two Francis turbines each on 6,3 MW. The transmission voltage is a 138 kV circuit through a 500 m line that connects to the Tena – Coca line which is linked to the National System.</p>
Technology to be employed	<p>The Project will use the run-of-river technology for power generation; hence this type of hydroelectric plants does not require a big dam construction. Therefore, the Jondachi Project will use common hydroelectric technology used in different countries.</p> <p>In the Jondachi Project is going to be installed two Francis turbines. Each turbine will have an installed capacity equivalent to 6,3 MW. It is very probably that will be used German equipment.</p>
Project developer	
Name	Energía Renovable y Desarrollo Sustentable – ERDESU S.A.
Organizational category	Private company
Other function(s) of the project developer	Project sponsor
Summary of the relevant experience of the project developer	<p>ERDESU S. A. is a regional private company whose goal is to promote the sustainable utilization of water resources and socio-economic development within the Amazonas Region. The financial structure of ERDESU S. A. includes the following shareholders: local governments from the Province of Napo (30%), indigenous organizations (10 %) and national and international private companies (60 %).</p> <p>The intention of the company is to generate clean energy based on a management model that strengthens the indigenous organizations. Additionally, this model supports preservation of watersheds, production of revenues for the shareholders and sustainable utilization of water resources located at the Ecuadorian North-eastern region – specially at the Sumaco Natural Reserve (RBS) –</p>
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Project Sponsors / financiers	

Name	Proyecto Hidroamazónico – PROHA (The HidroAmazon Project)
Organizational category	Technical advisor / financer
Main activity	<p>The HidroAmazon Project – PROHA is a bi-national agreement between the governments of Germany and Ecuador. The PROHA aims to make sustainable use of the renewable natural resources at the Ecuadorian Amazon Region. This project is supported by the Napo Provincial Council, the Municipalities of Tena and Archidona, the Federation for Organizations of the Kichwas from Napo – FONAKIN, the Ministry for the Environment and the Ministry for the Energy and Mines. Furthermore GTZ from Germany advises this project through the consulting firm called INTEGRATION.</p> <p>The purpose of PROHA is to achieve the improvement of the electricity supply through hydro energy resources at the Sumaco – Napo Galeras National Park. For this, the PROHA is going to progress the following activities:</p> <ul style="list-style-type: none"> • To do a decision making related to the construction of the Jondachi Hydroelectric Project. • To strengthen ERDESU S. A. as a regional company for generating hydropower energy
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Type of project	
Greenhouse gas targeted	CO ₂
CDM Sectoral scope	
<input checked="" type="checkbox"/> Energy production	<input checked="" type="checkbox"/> Renewable energy, except for biomass projects <input type="checkbox"/> Biomass <input type="checkbox"/> Cogeneration <input type="checkbox"/> Energy efficiency by the replacing of technology/existing equipment <input type="checkbox"/> Energy efficiency, by reengineering / process optimizing <input type="checkbox"/> Energy efficiency by fuel switch
Project location	
Region	South America
Country	Ecuador
Region / Province	Napo
City	Archidona
Brief description of location	The Jondachi Hydroelectric Project is located close to the city of Archidona on the Napo Province. The project takes advantage of the Jondachi-Misahualli River System.
Expected schedule	
Earliest project start date	2008
Estimate of time required before becoming operational after approval of the PIN	Time needed for financial commitments: 6 months Construction: 24 months
Project life span	50 years
Expected first year of Certified Emission Reduction (CER)	2008

Current status or phase of the project	Pre-feasibility studies already concluded.
Kyoto Protocol	Ecuador ratified the "UN Framework Convention on climate Change" on the 7th of November 1994 (R.O. #562). Ecuador ratified the Kyoto Protocol on the 20th of December 1999 (R.O.#1588).

B. Expected environmental and social benefits

<p>Estimated Greenhouse Gases abated (in metric tons of CO₂ equivalent)</p>	<p>Annual average energy equals to 87.700 MWh</p> <p>Per year (average) in the 10 Year: 56.567 ton CO₂eq/year Accumulated in lifespan: 2.828.325 ton CO₂eq/year Accumulated in 10 years: 565.665 ton CO₂eq/year Accumulated until year 2012: 282.833 ton CO₂eq/year</p> <p>The Jondachi Project will have an installed capacity of 12 MW, hence qualifies for a small-scale project as defined in Appendix B of the <i>Simplified modalities & procedures for small-scale CDM project activities</i>. Calculations for determining the baseline of the VHP were developed according to the <i>Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories/ Type I – Renewable Energy Projects / Category I. D. Renewable Electricity generation for a grid (Article 29)</i>.</p> <p>Following the methodology described in Article 29, the average of the “approximate operating margin” and the “build margin” is equivalent to <i>0,645 kg CO₂/kWh</i> or <i>0,645 ton CO₂/MWh</i>.</p>
<p>Baseline scenario (before the project)</p>	<p><i>Which emissions is the proposed CDM project displacing?</i></p> <p>The project will be connected to the National Interconnected System (SNI) which is a combined hydrothermal system. Hence the project will replace thermoelectric energy.</p> <p>By the Ecuadorian Electric Sector Law (LRSE, 1996) the electricity grid have to use the lowest cost electricity. In this scenery, with the cost of electricity being almost zero, the Jondachi electricity will displace the most expensive short-term marginal cost plans, which means that it will displace thermoelectric plants (diesel and fuel oil).</p> <p><i>What would the future look like without the proposed project?</i></p> <p>In order to cover the demand, thermoelectric plants and imported electricity from Colombia and Peru will be incorporated and dispatched. Furthermore, if the JHP were not implemented, Ecuador would make no use of its water resources for generating clean and renewable energy. In addition, the JHP constitutes an exemplar public/private management model for producing clean energy.</p> <p>Without the integration of the project’s carbon finance, it will be harder to confront the barriers, such as finance funding the construction of the Jondachi Project. In fact, the risk level of the project will be higher and consequently it will influence the accomplishment of the financing process.</p> <p><i>Describe the project barriers (finance, market, institutional, legal, and technological). What are the solutions to these problems?</i></p> <ul style="list-style-type: none"> • <i>Investment barrier:</i> In Ecuador, there are barriers for investing in a hydropower plant, due to higher investment costs, far longer construction periods and longer investment return times (compared to thermoelectric plants). Despite the Ecuadorian Electric Sector Law encourages the development of hydroelectric energy projects, there are no specific incentives for hydro projects. The CDM component helps reduce financial barriers prevailing for hydropower projects such as Jondachi. • <i>Sectoral/institutional barrier:</i> The no-pay culture prevailing in Ecuadorian energy generating suppliers has led to a financial situation critical to the energy generation because of the large portfolio accrued. This situation has produced a disincentive to the signing of long-term contracts and a hurdle to the development of new energy generation projects. The CDM helps remove this hurdle thus reducing the commercial risk of projects in Ecuador. <p><i>Which politics, strategies, laws etc. affects the project activities?</i></p> <p>The Ecuadorian Electric Sector Law (LRSE, 1996) changed the structure and organization of this sector. The Law created the National Electricity Council (CONELEC) as the sector regulator, and the National Energy Control Center (CENACE), a non-profit private corporation in charge of the technical supervision of the interconnected system (generation and transmission) and the commercial administration of the Wholesale Market (MEM).</p> <p>The Law commits to CENACE the supervision of operation and generation as well as all</p>

	<p>transmission systems. This activity is performed through a centralized economic dispatch (the principal behind is to develop a generation sector under competition) in which, every plant operates and produces energy depending on the variable cost (mainly depending on fuel costs). Each plant declares its own variable cost and CENACE can audit that cost. As a result, dispatch is performed starting from the cheaper and more efficient plants toward the more expensive and eventually more inefficient. Depending on the nature of the energy source and the ranking of variable costs, the demand curve is covered.</p>
Specific global and local environmental benefits	
Global benefits	<ul style="list-style-type: none"> • The project will abate GHG emissions, through displacement of thermoelectric generation from the National Interconnected System. It will reduce approximately 56.567 tCO₂ per year, contributing to mitigate the Climate Change. • The intake design of the run-of-river plant will not flood extensive areas; therefore, the project will not emit methane CH₄. • The project contributes to the preservation of the Amazon watersheds, which implies conservation of the biodiversity in areas recognized as "significant for the World".
Local benefits	<ul style="list-style-type: none"> • The characteristics of the JHP and its construction methodology will not permit a negative damage to the ecosystem. Moreover, it will allow the project to conserve the biodiversity of this particular zone on the Ecuadorian Amazon Region. • The JHP uses a renewal resource and it does not imply any consumptive use due to the restitution of the water after being used. For that reason, the construction of the Jondachi Project does not affect the water of the Jondachi-Misahualli River System, neither in the present nor in the future. Consequently, it also guarantees the JHP energy production during its expected lifespan. • The lack of productive alternatives for the population has caused the unsustainable utilization of the Amazon natural resources (e.g. rivers, forests). Nevertheless, with the project the people will have to maintain the watersheds. • Each kWh of energy generated by a renewable energy source (water) will avoid the contamination with polluting aerosols as SO₂, NO_x etc. Normally, these contaminants are produced and set free by the generation in thermoelectric facilities. The abatement of these aerosols and chemicals has local benefits for the habitants that are living close to the thermoelectric plants. Because the ongoing contamination can let to respiratory diseases.
Environmental impact study	<ul style="list-style-type: none"> • The Preliminary EIA is already concluded and approved by CONELEC; impacts identified on this study will be mitigated according to Environmental Management Plan. For example, as part of this EIA, an Ichthyology Study was developed in order to assess the ecologic flow according to international standards. • This Preliminary EIA is going to be used as the main reference for the Definitive EIA. • Prior the issuance of the Environmental License, the Definitive EIA will be submitted to CONELEC to get the approval.
Which guidelines will be applied?	<ul style="list-style-type: none"> • The Environmental Management Law (1999) is the macro regulation that rules the Ecuadorian State environmental policy and by which all individuals executing actions related to the environment as a whole shall abide. The Law sets forth the institutional framework the Project shall abide by, providing for the role to be played by the Environmental Authority. • The Ecuadorian Electric Sector Law (LRSE) is the act that rules all the activities in this area. Article 3 of this Law establishes procedures related to protection and preservation of the environment. These regulations rule all actors involved in generation, transmission and distribution of electric energy. • Before the construction of the project, the definitive EIA will be presented to CONELEC (www.conelec.gov.ec) to get its approval and the Environmental License. These studies are being developed following the environmental rules that CONELEC has elaborated (Official Register 396 of August 23th 2001, "Environmental Regulation for Electric Activities", see www.conelec.gov.ec). This regulation contents criteria and recommendations expressed by the Ministry for the Environment (Ecuador), other environmental organizations and the World Bank.
Socioeconomic benefits from the project	
Benefits on the national / sub regional level	<ul style="list-style-type: none"> • Ecuador needs to purchase great amounts of diesel to supply the energy generation in the thermoelectric facilities. The project especially will replace this fuel so it will help to decrease the dependence of foreign currencies.

	<ul style="list-style-type: none"> • The Napo Province has always suffered electrical shortages. The JHP will not only cover energy demand of this province which is equivalent to 5 MW but will also supply energy to others provinces from the Ecuadorian Amazon Region.
Benefits in local level	<ul style="list-style-type: none"> • Direct & Indirect employment is going to be generated during the construction phase and during all of its lifespan. This effect permits the community to improve incomes and life style. It will also allow a community development since low price and clean electric energy produced in the zone will contribute to create new enterprises around this area. • The project is going to support the decentralized efforts conceived by the local governments and the indigenous organizations. Indeed, these entities will receive part of the profits produced by the company (40% from the total). • At Project's site, the company is going to establish a "Show Room" where people and specially students will receive information about generation with clean energy.
Social impact study	<ul style="list-style-type: none"> • Part of the Definitive Environmental Impact Study will be as well an extensively participation of the local habitants. People will be informed trough meetings in the local township. The local opinion will have influence in the way the project will be implemented. As required by Law, part of the Approval Process of the EIA will be hold with local stakeholders and local/national authorities. • FONAKIN, the most important indigenous organization from Napo, is an ERDESU's shareholder. Hence, ERDESU S. A. has kept in touch with indigenous communities settled around the Project site in order to prepare strategies for mitigating environmental, social and economic impacts. • At this moment, the first positive social impact has been identified by ERDESU S. A. Organizations from FONAKIN are going to obtain revenues from selling energy (6,5 %). These profits will help to develop productive and social projects.
Which guidelines will be applied?	<ul style="list-style-type: none"> • The project will comply with rules and requirements regarding to social impacts and community participation. These issues will be taken into account during the preparation of the EIA study.
Environmental strategy / priorities of the Host country	<ul style="list-style-type: none"> • The Ecuadorian Electric Sector Law establishes as core objectives, those related to the sustainable management of natural resources and the improvement of technology in electrical activities. This Law also stresses on the promotion and development of renewable energy technologies. Additionally, these issues are outlined in the sector's secondary legal framework and CONELEC's "Electric Indicative Plan" (the referential Sector Development Plan). • Further on, key policies and strategies of the country, such as the "<i>Environmental Strategy for Sustainable Development</i>" adopted by the Ministry for the Environment in 1999 (www.ambiente.gov.ec), encourages developing and implementing renewable energy projects. • In the context of National Climate Change Policy, the National Climate Change Committee (CNC) has pointed out the use of renewable energy as one of the key dimensions for mitigation policy & measures. This matter is outlined in official policy & assessments papers such as the First National Communication to the UNFCCC. Regarding national carbon offset & trade policy, one of the goals is to achieve a convergence between sustainable energy development and global climate change mitigation. The development of renewable energy projects under carbon trade schemes and the actions of the Designated CDM National Authority (DNA) as well as the National CDM Promotion Office (CORDELIM) is an essential part of it. • The Project's strategy aims to make use of water resources from the Sumaco Natural Reserve. Generating sustainable energy will be the main output, the others are: <ul style="list-style-type: none"> ○ To foster small and micro scale business, ○ To get revenues for the region trough selling energy to the National Interconnected System, ○ To increase the quality of life from the local population, ○ To contribute to the preservation of the forest resource.

C. Finance

Total project cost estimate				
Development costs	US\$ 1.645.000			
Construction/installation costs	US\$ 17.355.000			
Other costs				
Total project costs	US\$ 19.000.000			
Sources of finance to be sought or already identified				
Equity	US\$ 375.000	Napo Provincial Council	2 %	committed X / negotiation <input type="checkbox"/>
	US\$ 375.000	Municipality of Tena	2 %	committed X / negotiation <input type="checkbox"/>
	US\$ 375.000	Mun. of Archidona	2 %	committed X / negotiation <input type="checkbox"/>
	US\$ 375.000	FONAKIN	2 %	committed X / negotiation <input type="checkbox"/>
	US\$ 4.200.000	Private investors	22 %	committed <input type="checkbox"/> / negotiation X
Debt – Long term	US\$ 13'300.000	Banks	70 %	committed <input type="checkbox"/> / negotiation X
Debt – Short term	US\$	organization	% del total	committed <input type="checkbox"/> / en negotiation <input type="checkbox"/>
	US\$	organization	% del total	committed <input type="checkbox"/> / en negotiation <input type="checkbox"/>
Non identified	None			