

Clean Development Mechanism

Sustainable Development co-Benefits Description Report¹

CDM project activity or programme of activities (PoA) information	
Title	Candelaria Hydroelectric Project
Pre-registration reference no.	
Reference no.	604
Type	Project Activity
Sectoral Scope	Energy industries (renewable - / non-renewable sources) (1)
Host Party	Guatemala

Report information	
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Name of third party verifier and/or comments	Some environmental indicators haven been verified by the Guatemalan Ministry of the Environment and Natural Resources and by the National Forests Institute (INAB). Some social indicators have been verified by the Sustainable Development Unit of the Ministry of Energy and Mines.

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Overview of sustainable development co-Benefits

A. The extent of environmental co-Benefits:

		N/A	No	Slightly	Partly	Highly
Air	Reducing Sox					•
	Reducing Nox					•
	Reducing Fly ash					•
	Reducing suspended particulate matter (SPM)	•				
	Reducing Non Methane Volatile Organic Compounds (NMVOCs)	•				
	Reducing Noise Pollution	•				
	Reducing Odors	•				
	Reducing Dust	•				
	Other air quality improvements	•				
Land	Preventing end of life products/ equipment (solid waste)	•				
	Producing/using compost	•				
	Producing/using manure, mineral fertilizer or other soil nutrients	•				
	Irrigation	•				
	Preventing soil erosion					•
	Minimum tillage	•				
	Other means to improve land quality					•
Water	Improving management/control of wastewater	•				
	Saving/conserving of water					•
	Improving reliability/accessibility of water supply			•		
	Purification/cleaner water supply			•		
	Improving ecological state of water bodies	•				
	Other means to improve water	•				
Natural Resources	Protecting mineral resources	•				
	Protecting/enhancing plant life					•
	Protecting/enhancing species diversity					•
	Protecting/enhancing forests					•
	Protecting/enhancing other depletable natural resources	•				

B. The extent of social co-Benefits:

		N/A	No	Slightly	Partly	Highly
Jobs	New long-term jobs				•	
	New short-term jobs				•	
	New sources of income generation	•				
	Other employment opportunities				•	
Health & Safety	Disease prevention				•	
	Reducing accidents				•	
	Reducing crime	•				
	Preserving food	•				

	Reducing health damaging indoor air pollution		•	
	Enhancing health services			•
	Improving sanitation and waste management	•		
	Other health and safety improvement	•		
Education	Job-related training			•
	Enhanced educational services		•	
	Project-related knowledge dissemination			•
	Other educational benefits		•	
Welfare	Improving working conditions		•	
	Community or rural advancement			•
	Poverty alleviation (more people above poverty level)	•		
	Improving wealth distribution/ generation of income and assets	•		
	Increased municipal revenues			•
	Optimized women's empowerment	•		
	Reduced traffic congestion	•		
	Other welfare benefits	•		

C. The extent of economic co-Benefits:

		N/A	No	Slightly	Partly	Highly
Growth	New investments	•				
	New industrial/commercial activities					•
	New infrastructure	•				
	Enhancement of productivity	•				
	Reduction of production costs (services)	•				
	New business opportunities					•
	Other economic benefits	•				
Energy	Improvement in supply of energy					•
	Access to energy					•
	Affordability and/or reliability of energy	•				
	Other energy improvements	•				
Technology	Introducing/developing/diffusing imported technology				•	
	Introducing/developing/diffusing local technology	•				
	Adaptation of new technologies to local circumstances	•				
	Know-how activities for a technology	•				
	Other technological benefits	•				
Balance of payments	Reduction of foreign dependency				•	
	Other macro-economic benefits	•				

D. Further information:

	Information required			
		Yes	No	N/A
				•

Detailed description

A. Environmental co-Benefits

	Indicator	Specification	Extent
Air	The CDM improves air quality by reducing air pollutants as follows:		
	SOx	<i>The hydroelectric plant generates a yearly estimate of 25 GWh of renewable energy, which is delivered to the national grid. This energy replaces the same amount of energy that would otherwise be provided by fossil fuel power plants. Consequently, the project activity mitigates SOx emissions associated with fossil-fuel consumption.</i>	Highly
	NOx	<i>Besides SOx emissions, the plant also lowers NOx emissions by reducing the need for energy generated by fossil fuel power plants connected to the grid.</i>	Highly
	Fly ash emissions	<i>The station reduces national emissions of fly ash and other particles often associated with power generation by preventing increased fossil-fuel consumption.</i>	Highly
	SPM		N/A
	NMVOCs		N/A
	Noise		N/A
	Odors		N/A
	Dust		N/A
	Other air quality improvements		N/A
Land	The CDM improves the soil quality and/or avoid soil pollution, waste disposal as follows:		
	Pollution prevention		N/A
	Compost		N/A
	Manure, mineral fertilizer or other soil nutrients?		N/A
	Irrigation		N/A
	Soil erosion	<i>We are working towards the preservation of the rainforest that surrounds the project and towards the reforestation of adjacent areas. However, the area around the project is prone to landslides of considerable proportion, which is exacerbated by the fact that Guatemala is one of the most vulnerable countries in the world when it comes to the effects of climate change. To prevent soil erosion, our maintenance crew has focused on storm-water management by fortifying roadsides and building rainwater drainage channels, among other activities. To ensure (and reinforce) slope stability, we have also been building retaining walls and combining them with gabions. Finally, we are also establishing living barriers of certain plants that have strong root systems (e.g., bamboo and vetiver).</i>	Highly
	Tillage		N/A
	Other means to improve land quality	<i>Our reforestation efforts, as well as our efforts to protect natural forest cover in the area, ensure soil permeability and the conservation of nutrient-rich soils, which are</i>	Highly

		<i>being depleted in the area due to an increasing number of agricultural projects and practices.</i>	
Water	The CDM improves the quality of water and access to water as follows:		
	Waste water		N/A
	Conservation of water	<i>Our reforestation efforts, as well as our efforts to protect the area's natural forest cover, preserve and enlarge water recharge areas.</i>	Highly
	Distribution	<i>The establishment of a potable water grid for neighboring indigenous communities is being studied and evaluated by the Candelaria developers, who would work on the project together with the Guatemalan Municipal Development Institute.</i>	Slightly
	Purification or a cleaner supply	<i>As part of the project's social responsibility program, we supply clean cook stoves and water filters to families and schools in nearby communities. This program is carried out by the Trece Aguas Foundation (an organization established by Candelaria developers aimed at investing in local communities) in partnership with other social investment organizations.</i>	Slightly
	Water bodies		N/A
	Other means		N/A
Natural Resources	The CDM protects or enhance depletable natural resources as follows:		
	Mineral resources		N/A
	Plant life	<i>By protecting the natural rainforest around the project site, ecosystems and plant habitats are preserved.</i>	Highly
	Species diversity	<i>Biotic monitoring results reflect significant biodiversity in the area. The protection of the areas that surround the project, which consist of natural rainforest and reforested land, provides safe habitats for a variety of flora and fauna that are under severe threat because of human activities.</i>	Highly
	Forests	<i>We have reforested more than 900 hectares in the areas surrounding the station. These reforestation projects have been approved and certified by the National Forests Institute (INAB). Additionally, 809 hectares of natural rainforest around the project have been registered (so far) as a protected area under the Guatemalan Forest Authority.</i>	Highly
	Other depletable natural resources		N/A

B. Social co-Benefits

	Indicator	Specification	Extent
Jobs	The CDM creates new job opportunities including income generation as follows:		
	New long term jobs	<i>The project generates direct and indirect long-term jobs.</i> New long-term jobs > 1 year - 15	Partly
	New short term jobs	<i>More than 100 short-term jobs were created during the development and construction of the power plant.</i> New short-term jobs < 1 year - 100	Partly
	Income generation		N/A

	Other employment opportunities	<i>Secondary projects that have been necessary throughout the implementation of the main project itself have generated even more job opportunities. These include security services, food services, the implementation of social investment projects, and the conservation and reforestation of water recharge areas, among others.</i>	Partly
Health & safety	The CDM results in health and safety improvements as follows:		
	Reduction of diseases, disease prevention	<i>Several projects aimed at improving the standard of living of the indigenous communities that surround the power station are currently being designed and implemented by the Trece Aguas Foundation as part of our social responsibility program. One of the four main objectives of our Social Development program focuses on ensuring the food and nutritional safety of the surrounding communities, as well as implementing preventive health campaigns and medical missions. With this in mind, we've established a partnership with the Guatemalan Health Authority in order to work on health and hygiene campaigns in said communities.</i>	Partly
	Reduction of accidents	<i>We enforce occupational safety and health standards to make sure our employees are safe in their working environments.</i>	Partly
	Reduction of crime		N/A
	Preservation of food		N/A
	Reducing health damaging indoor air pollution	<i>A program consisting of the introduction of clean cook stoves and water filters has been in place since 2015 as part of our Social Development program's focus on health; several families and schools have benefited from the program, and many others will continue to do so. The adequate use of clean cook stoves can dramatically reduce smoke emission and the resulting exposure to harmful particles, reducing the rate of diseases associated with household air pollution, such as pneumonia, lung cancer, chronic obstructive pulmonary disease, heart disease, and eye infections, among others.</i>	Partly
	Enhancement of health services	<i>As part of our social responsibility projects, we built (and currently run) a Health Center that benefits more than 11 communities (about 4,000 people). The center has a general clinic, a birthing room, a sterilization area, a housing area for personnel, and a training center. Two nurses and two ambulance drivers/operators work at the clinic. Moreover, the Candelaria Hydroelectric Project, through the Trece Aguas Foundation, coordinates and supports the execution of medical missions, providing medical, surgical, and humanitarian services to the surrounding communities in partnership with national and international medical organizations.</i>	Highly
	Improved sanitation and waste management	<i>As part of our social responsibility projects, we built (and currently run) a Health Center that benefits more than 11 communities (about 4,000 people). The center has a general clinic, a birthing room, a sterilization area, a housing area for personnel, and a training center. Two nurses and two ambulance drivers/operators work at the clinic. Moreover, the Candelaria Hydroelectric Project, through the Trece Aguas Foundation, coordinates and supports the execution of medical missions, providing medical, surgical, and humanitarian</i>	N/A

		<i>services to the surrounding communities in partnership with national and international medical organizations.</i>	
	Other health and safety improvements		N/A
Education	The CDM facilitates education, dissemination of information, research or increases awareness as follows:		
	Job related training	<i>We carried out a formal education program from 2012 to 2014 in an effort to contribute to the professional and personal development of our staff, and to ensure the quality and growth of our operations. During this time every single one of our employees who didn't have it reached an upper secondary school level. Additionally, our HR Department runs a staff training program. One of our Social Development program's four main objectives, Economic Development, focuses on fostering the development of skills and abilities through diverse training programs. So far, we have provided our staff with training in motorcycle mechanics, baking, electricity, growing and harvesting corn, and beekeeping, among others.</i>	Highly
	Enhanced educational services	<i>Together with Guatemalan educational authorities and a group of teachers and parents, we are currently implementing an educational project to enhance the reading, writing, and mathematics skills of school teachers and students in the surrounding communities. Through the program, teachers and coordinators hold workshops and establish partnerships with educational entities and organizations.</i>	Partly
	Project related knowledge dissemination	<i>Regional students, teachers, and community representatives are invited periodically to visit our facilities and learn about hydroelectric power plants.</i>	Highly
	Other educational benefits	<i>Through the Trece Aguas Foundation, regional schools are being repaired and refurbished with the support of Candelaria developers. Additionally, adjacent communities receive periodic donations of school supplies, desks, and other furniture, as well as materials for school and extracurricular activities.</i>	Partly
Welfare	The CDM improves local living and working conditions as follows:		
	Improvement of working conditions	<i>Employees at the power station, both from within and beyond the adjacent communities, work under above-average conditions that exceed those required by law. We believe that our most valuable asset is our people; with this in mind, we also run programs to train and educate our employees, and to protect their occupational safety and health.</i>	Partly
	Community or rural upliftment	<i>Our Rural Electrification Project has provided over 4,000 people with access to electricity.</i>	Highly
	Poverty alleviation		N/A
	Changes in distribution and/or generation of income and assets		N/A
	Increased municipal revenues	<i>The local municipal authority receives the station's property taxes.</i>	Highly
	Empowerment of women		N/A
	Reduced traffic congestion		N/A
	Other welfare benefits		N/A

C. Economic co-Benefits

	Indicator	Specification	Extent
Growth	The CDM supports economic development and/or stability as follows:		
	New investments		N/A
	New industrial/comercial activities	<i>As mentioned above, our Rural Electrification Project has provided over 4,000 people with access to electricity. This has made possible the establishment of new commercial activities that depend on electricity – blacksmith's workshops, improved carpenter's workshops, and shops that sell beverages and dairy-based products, etc. These in turn have resulted in an increased demand for the services provided by local businesses, such as food and hardware stores, among others.</i>	Highly
	New infrastructure		N/A
	Enhancement of productivity		N/A
	Reduction of production costs (services)		N/A
	New business opportunities	<i>As part of the station's social responsibility program, which was established by the Trece Aguas Foundation, projects aimed at improving the living standards and economic development of the surrounding indigenous communities are being designed and implemented. In order to generate new business opportunities, one of our Social Development program's four main objectives (Economic Development) focuses on fostering the development of skills and abilities through diverse training programs. So far, we have provided our staff with training in motorcycle mechanics, baking, electricity, growing and harvesting corn, and beekeeping, among others.</i>	Highly
	Other economic benefits		N/A
Energy	The CDM supports economic development and/or stability as follows:		
	Supply of energy	<i>The Candelaria plant delivers electricity to the Guatemalan Interconnected National System (SNI) through a 69-kV transmission line that connects to the previously existing 16-MW Secacao plant. The Candelaria plant also connects to a previously existing 13.8-kV distribution line that can provide several local communities with access to electricity. The project has delivered an average of 25 GWh of net electricity per year since it began operations.</i>	Highly
	Access to energy	<i>Revenues from the sale of CERs partly financed the development of a Rural Electrification Project, which was carried out in 2008 as a public-private partnership between the National Electricity Utility and Trece Aguas Foundation (an organization established by the Candelaria developers aimed at investing in local communities). This project provided nine communities (over 400 families, plus schools, churches, community centers, and small businesses) with electricity for the first time.</i>	Highly
	Affordability and/or reliability of energy		N/A
	Other improvements to energy		N/A
Technology transfer	The CDM results in a change in technology as follows:		
	New imported technology	<i>The project involves technology and know-how transfer to the host party, as follows: • The plant's turbine is</i>	Partly

		<i>British (Gilbert Gilkes & Gordon Ltd.). • The plant's generator is French (Leroy-Somer). • The project developer was supported by specialized consultants from the USA (EES Consulting Inc.).</i>	
	New local technology		N/A
	Adaptation of new viable technologies		N/A
	Know-how activities for a technology		N/A
	Other technological benefits		N/A
Balance of payments	The CDM results in improving the country's balance of payments as follows:		
	Reduction of the dependency on foreign sources of energy	<i>The development and operation of the Candelaria Hydroelectric Project, which runs according to Guatemala's Energy Policy and National Power Generation Expansion Plan, has been contributing to a more diversified national power grid, reducing the dependence on imported petroleum-based fuel and consequently reducing the cost of electricity.</i>	Partly
	Other macroeconomic benefits		N/A