SECTION A. Description of project activity

A.1. Purpose and general description of project activity

The Project Activity involves the construction of a Geothermal Power Plant (GPP) in San Jacinto, Nicaragua. The San Jacinto geothermal project is being carried out by Polaris Geothermal Inc. through its Nicaraguan subsidiary, Polaris Energy Nicaragua S.A. (PENSA)[2].They have signed a power purchase agreement (PPA) with Union Fenosa, the electricity utility in Nicaragua, for 20 years.

The proposed development involves the implementation and construction of a 77 MW geothermal plant[3].
The development will be carried out in the following two phases:

1. Phase 1: Installation of two backpressure steam turbo-generators of 5 MW each to test the production capacity of the geothermal field. Both turbo-generators were commissioned in July 2005, operated until July 2012, and decommissioned in Phase 2 of the project activity, in March 20; and,

2. Phase 2: Installation of two 38.5 MW condensing steam power units consisting of single flash steam/brine separation, with steam directed to a conventional condensing steam turbine. The first power unit began commercial operation in January 2012 and the second in February 2013.

At the end of the first crediting period in 2012 the plant had an installed capacity of 48.5 MW and an expected net annual export to the grid of 146,996 MWh. The plant has an installed capacity of 77 MW and the net annual export to the grid is expected to be 583,122569,864 MWh per year as of February 2013.
Nicaragua made minor investments in the energy sector during the 1980-1994 period. As a result Nicaragua has the lowest per capita electricity generation and consumption rate in Central America. Most of the Nicaraguan power system relies on thermal energy, above 72%. Also, energy demand in Nicaragua grew from 296 MW in 1993 to 381 MW in 1998. This represents a 28.7% overall growth rate over the five year period and an annual average rate of 5.74%. The Nicaraguan government realizes the need of investment in the electricity sector in base load alternative generating capacity, either geothermal or hydro. However, there is still a reliance on expensive and highly pollutant fossil fuel based sources of energy. The government of Nicaragua wants to pursue such an investment through public-private partnerships, where a private company gets the concession to exploit a natural resource. Although the government has released an Indicative Plan for Energy Expansion in Nicaragua where it explicitly says that renewable energy should be promoted, this development is ultimately left to private companies, which are linked to market forces and profitability requirements from shareholders.

Nicaragua is a country endowed with large geothermal potential, due to the presence of volcanoes of the
Marribios range along the Pacific coast. Geoscientific investigations were started towards the end of the
1960s, prioritizing the Momotombo and San Jacinto-Tizate geothermal fields. The commercial exploitation of Momotombo started in 1983 with 35 MW capacity installed, and expanded in 1989 to 70
MW. The strategy pursued by the project developer led to depletion of the reservoir and a decline in production to less than 10 MW. This demonstrates that:

[2] PENSA was previously called San Jacinto Power S.A.

[3] Capacity installed according to the nameplate of the turbines.

1. San Jacinto-Tizate area has been known as a potential geothermal area for long, but has not been pursued for financial barriers, that the CDM can help to overcome;
2. Although there is a geothermal plant in Nicaragua, this has not brought great expertise to the country on geothermal development due to bad management. It also provides an example of the risks of geothermal technologies; and
3. Due to failure to develop successful geothermal projects in the country within the last decades, people's perception of geothermal power might be of an unreliable source of electricity, and thus, there is a social risk attached to the project.

By utilizing the existing geothermal resources of San Jacinto-Tizate to generate electricity, the proposed project activity will displace 77MW (569,864 MWh) of electricity produced by a fossil-fuel intensive electricity grid, which has a carbon emission factor (CEF) of 0.754 tCO_2/MWh. Expected emission reductions from the proposed project activity are 63,322 tCO_2 per annum.

Contribution to Sustainable Development

The Government of Nicaragua is committed to the principles of sustainable development and to the implementation of a national sustainable development strategy, which specifically includes the promotion of renewable energies in the country.

The proposed project activity contributes to the sustainable development of Nicaragua, and specifically, to the Department of León, as follows:

• The project contributes to meeting the objectives of the "National Development Plan and Enhanced Strategy for Economic Growth and Poverty Reduction" (in Spanish, "Estrategia Reforzada de Crecimiento Económico y Reducción de la Pobreza y el Plan Nacional de Desarrollo"). By providing clean electricity the project will clearly bring economic and development benefits to a depressed area in the department of León. The implementation of the project activity is expected to improve the situation of local industries in the area, due to an improved electricity supply, contributing at the same time to reducing the costs of electricity generation.

• The proposed project activity increases foreign investment in the country.

• The San Jacinto-Tizate project contributes towards the goals of "National Action Plan to combat Climate Change" (in Spanish, "Plan de Acción Nacional para enfrentar al Cambio Climático"), because the proposed project activity will be generating electricity from an environmentally-friendly technology, using an indigenous and clean source displacing more carbon intensive electricity from the grid.

• Further environmental benefits will be achieved through the reduction of air-based pollutants, such as oxides of nitrogen, sulphur oxides, carbon monoxide and fine particles, being emitted into the atmosphere due to the reduced combustion of fossil fuels.

• A further economic benefit from the project is that using geothermal energy from Nicaragua reduces the dependence on importation of fossil fuels and thus isolates the national economy from fuel price fluctuations. This improves the security and diversity of electricity supply.

• The proposed project activity is an example of successful technology transfer, which will increase the skills and expertise of Nicaraguans, specifically in developing geothermal power projects (see also A. 3).

• The proposed project activity leads to increased employment opportunities for locals and contributes towards employment generation in general. It has been estimated that a total of 500 direct employments and thousands of indirect jobs will be created along the construction of the project. For the maintenance and operational phase of the project, up to 50 professionals will be required, which at least 50% will be locals. Most of the direct jobs created during the construction phase are covered by nationals, especially from the surrounding villages and the city of León.

In absence of the project activity, electricity generation would continue to come from fossil-fuel based plants, and therefore, none of the abovementioned social, environmental and economic benefits would take place. Additionally, geothermal research has identified that there are at least another ten areas of geothermal interest in Nicaragua that could be developed as an energy resource. This implies that the proposed project activity has the potential to contribute to the long-term general economic and social development of Nicaragua by demonstrating the use of a renewable energy alternative technology that could be applied on a larger scale throughout the country.

A.2. Location of project activity

A.2.1. Host Party

Nicaragua

A.2.2. Region/State/Province etc.

Department of León

A.2.3. City/Town/Community etc.

San Jacinto

A.2.4. Physical/Geographical location

The Project Activity is to be located in the rthwest of Managua, in the Department of León, between the towns of Telica and Malpaisillo, to approximately 120 km from Managua and 20 km from the City of León. Nicaragua is situated in the Central American Isthmus, bordering both the Caribbean Sea and the North Pacific Ocean, between Costa Rica and Honduras. The geographic coordinates are 13 00 N, 85 00 W.

The project site is approximately 2km to the North of Caserío San Jacinto, which is to the north side of the Tizato hill. The project site covers approximately 8km^2, which is unoccupied except for sparse subsistence farming in some peripheral areas. The area to be occupied for the project has been acquired from the nearby farmers. However, only 25% of the total project site will actually be utilized for equipment and the project developer is happy to permit that the remainder 75% of the land to be used for farming or grazing purposes.

The nearest village is San Jacinto, a small settlement adjacent to the established project base camp. It is isolated from the project site by low hills and no part of the project is visible from the village. Paved road access passes through San Jacinto. A nearby gravel road turns off a short distance north of the base camp, and provides access to the site. The plants will be installed at an altitude of 200 metres above sea level. The wells will be located between 160 and 180 metres above sea level in the San Jacinto area.

Figure 1. Map of Nicaragua showing project location

A.3. Technologies and/or measures

The implementation of the project activity comprises two phases. The second phase is developed in two stages. These are described in Table A.3.1 below.

Table A3.1 Phases of the project activity and technologies to be used

	Phase 1	Phase 2	
		Stage 1 (Fuji Unit 1)	Stage 2 (Fuji Unit 2)
Starting date of commercial operation	01/06/2005	07/01/2012	08/02/2013
Decommission date	08/02/2013	Decommission date is unplanned	Decommission date is unplanned
Installed capacity[4]	10 MW	38.5 MW	38.5 MW
Plant load factor[5]	98%	98%	98%
Net capacity factor[6]	92.84%	92.84%	92.84%
Annual gross energy production[7]	81,327 MW	313,112 MW	313,112 MW
Annual estimated electricity production[8]	78,888 MWh	284,932 MWh	284,932 MWh
Production period	From 01/06/2005 to July 2012	From 07/01/2012 to the decommission date	From 08/02/2013 to the decommission date

[4] Installed capacity as per turbines nameplates.

[5] Presented in third party engineering report "Value Added Report" dated 20 November 2009, by Sinclair Knight Merz (SKM). Page 19.

[6] Presented in third party engineering report "Value Added Report" dated 20 November 2009, by Sinclair Knight Merz (SKM). Page 19.

[7] As calculated in Table B.3.2.

[8] As calculated in Table B.3.2.