



ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE

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CHOLUTECA I AND II HONDURAS



Figure 01: Aerial Image of Project
Sources: Picture sent by Sun Edison

Arianna M. Galán Montás prepared this case study under the supervision of Cristina Contreras ENV-SP with Judith Rodriguez ENV-SP as part of the Harvard-Zofnass program directed by Dr. Andreas Georgoulis by initiative of IDB for the purposes of research and education.

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EXECUTIVE SUMMARY

The project Choluteca I and II consists of two solar photovoltaic power plants developed, constructed, and currently operated by SunEdison in the southern region of Choluteca, Honduras, as part of a larger renewable energy program through which the government of Honduras is seeking to develop solar resources to diversify the energy matrix in the country.

Choluteca I and II are located in a 151 ha site and possess a total capacity of 58 MWp, being expected to generate 112 GWh per year and to prevent the emission of 31,810 tons of CO₂ per year. The total energy production of the plants is being sold to the state-owned utility company Empresa Nacional de Energía Eléctrica, with which a 20-year power purchase agreement was signed. The projects will be connected to the Sistema Interconectado Nacional in Choluteca through the Santa Lucía substation, an existing substation located in the outskirts of Choluteca. The construction phase of the project began in September 2014 and was finalized in July 2015. The operation phase began on August 4, 2015, after interconnection took place on July 27, 2015. The project lifespan is estimated at 30 years, and the possibility of extending its operation will be evaluated once the current operation phase ends. The Choluteca I and II plants have an estimated investment cost of around US \$61.8 million. The project has sought financing from the International Finance Corporation, Central America Bank for Economic Integration, and the OPEC Fund for International Development.

Overall, the project has done excellent work to improve the quality of life of its surrounding communities and has shown a deep commitment to establishing a relationship with the population and the main stakeholders. First of all, the project will improve quality of life through the generation of renewable energy and consequent reduction of greenhouse gas emissions, generating electricity to be supplied to the power grid of Honduras. From the beginning, the project team developed a close relationship with the surrounding communities of San José de la Landa, Colonia El Edén, Colonia Victor Manuel Argeñal I, and Aldea Montecillos, identifying community needs and goals and developing community-specific projects for the provision of potable water, electricity, and safety in the area. The project team also engaged in a series of mitigation strategies to reduce the direct impact of Choluteca I and II on nearby communities, including a series of measures to reduce noise and dust generation during the construction phase and to improve site mobility and accessibility through the creation of internal roads within the project site and the placement of wayfinding and safety signage. In particular, a detailed reforestation program was developed aiming to mitigate the impacts of the project and ensuring that the visual impact of the plants is reduced through the planting of native species along the project perimeter.

The category of Leadership presents a considerable area of opportunity for Choluteca I and II. The project team has shown a commitment to sustainable development both in the policies and commitments of SunEdison as well as in its approach to project design and operation, supported by its environmental impact assessment and social investment plan. The project exhibited productive collaboration by involving the community stakeholders throughout the construction phase and truly including the affected communities in the creation of a social investment plan to improve the quality of life of their communities. The team also exhibits a long-term view of the project, having developed a detailed monitoring and maintenance plan describing efforts to prevent problems and correct the performance of all equipment both physically and through digital monitoring programs, as well as showing a desire to extend the project's useful life beyond its first 30 years.

The project exhibits a great performance in the Resource Allocation category in relation to Energy, and an important area of opportunity in the subcategories of Materials and Water. Choluteca I and II generate a net positive renewable energy amounting to 112 GWh per year. The project uses some of the generated renewable energy for the plant's operation; the rest supplies electricity to the national power grid. Long-term waste management plan has been developed to decrease the project's waste and divert it from landfills. The project has reutilized excavated materials in the construction of platforms, roads, buildings, and drainage, amounting to an 81% reutilization of excavated materials.

In the Natural World category, Choluteca I and II exhibited important efforts in preserving habitats, species, adverse geologic zones and other natural systems in the area while minimizing the impact on the project site. The site's main geological risk is that Honduras is prone to earthquakes. In order to address this, a geotechnical assessment was performed on site to determine the corresponding foundation types based on the soil's inherent capacities. Given its siting, defined as land for agriculture and livestock use, the project is neither preserving prime farmland nor greenfields.

Choluteca I and II had an excellent performance in the Climate and Risk category, particularly in the Emissions subcategory. Since the project generates renewable energy, it does not involve the use of fossil fuels and therefore prevents the emission of greenhouse gases as part of the process of energy generation. The project is estimated to prevent the generation of 31,810 tons of CO₂ emissions every year, which is equivalent to the energy generated from at least 600,000 barrels of heavy fuel. The project team has developed a plan related to short-term emergency control that identifies earthquakes, storms, and inundations as the main climate threats for the

area, as well as other types of man-made hazards such as fires and electrocutions. The plan includes information such as annual emergency drills for each type of threat, meeting points and evacuation routes, and training for the project's personnel.

The evaluation of Choluteca I and II has shown the project strengths as a model for renewable energy generation, as well as its contribution to Honduras' sustainable development. At the same time, it has also indicated which categories of the project provide the largest opportunities for improvement in order to ensure a more integrated and holistic approach to sustainable infrastructure development. The categories with the best performance, Quality of Life and Leadership, could be improved by furthering efforts that are already ongoing in the project. The team could take advantage of the community studies already performed to target initiatives for local employment and skills development for the population, as well as the creation of public spaces that would enhance community livability. In the area of Leadership, the team could further clarify its commitment to sustainability through the creation of a comprehensive sustainability management plan ensuring that sustainability goals are met in the project.

In the category of Climate and Risk, the existing emergency plan could be strengthened by including more detailed information on both short- and long-term threats such as an analysis of past climate events and impacts as well as forecasts. Finally, the two categories with the largest opportunities for growth, Resource Allocation and Natural World, show the need for a stronger management plan for materials and water resources. While the project doesn't involve significant consumption of water, proper evaluation and monitoring of water levels and quality should be put in place. This will enable the team to assess the success of mitigation strategies for impacts on erosion and stormwater management. The project could also document the origin of used materials to demonstrate their efforts to include more regional materials to minimize the cost and negative impacts of transportation, and consider incorporating recycled materials.

	
Figure 2: People & Leadership award Summary of results	
	
Figure 3: Climate & Environment award Summary of results	
	
Figure 4: Infrastructure 360 award Summary of results	