

Hydroelectric Power Plant in Guatemala Chooses HDPE Pipe to Convey Water

Choloma, Guatemala

Background

Hydroelectric power, a highly efficient renewable energy, uses the gravitational force or weight of water to produce electric power. A small-scale hydroelectric power plant produces no direct waste and has negligible levels of greenhouse gas emissions (such as carbon dioxide or CO₂) when compared to power plants that use fossil fuels.

Grupo Secacao, a group of companies based in a tropical region in northeastern Guatemala, Central America, owns and operates two established hydroelectric power plants on its 3,000 hectare property that generate about 21 megawatts of electricity. They are adding a third hydroelectric power plant, the Choloma plant, which will use rivers on the property as its main water source. There are several water sources on the property, mainly the Secampana, Secampanita, Golondrias, Caquipec and Choloma Rivers.

Once completed, the plant will generate at a capacity of approximately 10 mega watts, which in combination with the company's two other power plants, can potentially provide power to about two percent of the Guatemalan electricity demand. All the plants will feed the main power grid in Guatemala.

The plant locations, located a few miles apart from one another, are in a remote part of Guatemala. Access to the project site included helicopter rides and long drives. Planning ahead and ensuring that the correct materials were sent on site was a top priority.

Also, as maintaining a healthy ecosystem in the area is important to Grupo Secacao, the company maintains a sustainable environment around the three power plants, protecting the land, environment and watersheds.



After the HDPE pipe was fused it was installed underground and eventually connected to a tank. The flow of the water will power a turbine, generating power.



The HDPE pipe is fused onsite while visitors observe the fusion process.

On 700 of the 3,000 hectares, the company planted new trees and reforested areas of the property. In addition, Grupo Secacao has a conservation program in place on 500 hectares of the property, which is a tropical rainforest that includes a variety of plants and wildlife.

Why HDPE Pipe?

Parts of the water conveying system that lead to the Choloma plant require only a low-pressure piping system. In addition, the pipeline terrain from the rivers has many hills and curves. Using steel pipe, which was the piping material Grupo Secacao used in the past, would have required a significant amount of fittings and welds that would take more time and include several design challenges in this undulating landscape. Since using steel pipe was more costly, Grupo Secacao decided to look into other potential piping materials, one of which was high-density polyethylene (HDPE) pipe.

Since the company had not used HDPE pipe before, the company met with ISCO Industries, a pipe distributor and fabricator of piping products, to learn more about the pipe for low-pressure applications. Mike James, ISCO's director of business development took Grupo Secacao's vice president and executive director Rudolf Jacobs and general manager Rodrigo Tormo on a tour of a project in Oregon to show them the benefits of HDPE pipe and potential use for their project. A few days later, James traveled to Guatemala to visit the Choloma project and do a walk through of the pipeline system and assist in details related to an HDPE pipe system.



A view of the HDPE pipe along the hilly landscape characteristic of this part of Guatemala.

Grupo Secacao was pleased with what they saw and learned, and after several discussions and meetings, contracted with ISCO to supply approximately 8,000 feet of 36-inch HDPE pipe, 10,000 feet of 48-inch HDPE pipe, nearly 5,000 feet of 18-inch pipe as well as some 24-inch pipe. In addition, ISCO provided several fittings, valves, flange adapters and McElroy fusion equipment rentals (T900 and 1648 models) along with three onsite ISCO field technicians – David Reyes, Jose Reyes and Jaime Cristancho.

Why ISCO Industries?

James, Ted Amaya, ISCO vice president of international sales, and Carlos Moreno, ISCO director of international business development, visited the Choloma project site on several occasions to ensure that the installation was a success.

Jacobs said, "... that attention and involvement is by far what has made this the most valuable experience in working with ISCO on this project. It's become a standard ... so a few of the other suppliers are under pressure now. For example the other pipe supplier, the high-pressure steel pipe provider, we were having a few discussions with them and at some point our main complaint became – listen, you know our other supplier of the low-pressure pipe, they have visited us at least five times now and they are always on the phone and available per email, but you haven't come down once. So about two weeks later, one of them showed up. ISCO set a high bar."

Tormo added, "The good thing about ISCO, and definitely a good impression, is that ISCO takes care of, and treats the same way, a small customer as a big customer. The service that ISCO brings is the same no matter the customer size."

Installation

ISCO Industries began supplying the materials for the low-pressure water conveyance application in December 2010. Soon after, Grupo Secacao started to fuse the HDPE pipe with help from ISCO's three field technicians who were on location for several months to both fuse pipe and to provide

fusion instruction to the company's crew.

Jacobs highly regarded the contribution of the three technicians to the project. He commented that one of ISCO's techs brought additional value to the project because of his ability to see the "big picture" much like a project manager would, always thinking ahead and evaluating what needed to be accomplished down the road.

He said, "For a complicated project like ours, it is very positive to have a field technician who thinks outside the box."

The fusion and installation of the HDPE pipe began at the Choloma plant and worked backwards toward the water source. The McElroy fusion machines were onsite for nearly eight months until all fusions were completed. In total, five miles of pipe were fused. Fusion times varied based on weather conditions, location and other factors. The area experienced heavy rains, some landslides and was overall in a very remote region of Guatemala, but the fusions still occurred in a timely manner.

Initially, the pipe was fused above ground and then later placed in a trench and covered. The HDPE pipe was fused and installed along the landscape, connecting river intakes and intersections, and running along the hills and curves of the area. The pipe installed ranged from 18-inch pipe to 48-inch pipe diameter. The HDPE pipe lines were then connected to a large steel holding tank. The water flowing to and through the tank will be used to power the Choloma plant.

Project Completion

Grupo Secacao completed the pressure test on the pipe and the system will soon be operating as planned. The water captured in this pipeline will power a turbine, generating 10 megawatts of hydroelectric power, which will be added to the existing 21 megawatts and fed into the Guatemalan main power grid.



Pipe connected inside a tank.