



# Alfredo Mainieri Protti Geothermal Field—Formerly Miravalles

by Susan Fox Hodgson  
cosmos@dcn.org



Alfredo Mainieri Protti, 1943-2013

The Instituto Costarricense de Electricidad, commonly called ICE, is charged with generating and distributing electricity in Costa Rica. ICE’s first major geothermal project, Miravalles Geothermal Field, has just been renamed after the person most responsible for its success, the late

Dr. Alfredo Mainieri. A related accolade is his sobriquet as the father of Costa Rican geothermal development.

Dr. Mainieri is held in high regard by geothermal colleagues for many reasons. Some are suggested by the quotation on the monument erected in his honor at Miravalles—more on that later. Others appear in my interviews with him and articles I’ve written about Miravalles Field for the past 30 years.

The following overview of Dr. Mainieri’s geothermal work, up to the year 2010, is based on this material. For clarity, the power plants are emphasized and most other events omitted. What remains is a record of his unflinching involvement in geothermal matters—geological, mechanical, financial, and political—throughout his decades of working for ICE.

As you read along, you may note—perhaps with a knowing smile—how the year when Power Plant Unit 1 is slated to go on line keeps moving further away. Such delays, surely frustrating, didn’t seem to faze him. Too, as the years passed, his comments to me became longer and more technical, reflecting the increasing complexity of successful field development.\*



Dr. Mainieri stands in Miravalles Geothermal Field by the brine holding pond at the wellhead power plant unit for well PGM-29. Note the steam cloud from the back-pressure unit on the far slopes of Miravalles volcano. Photo and watercolor by Susan Fox Hodgson, 2010, 2017

\*Most of the information comes from articles by S. F. Hodgson—either in the *Geothermal Hot Line (GHL)*, published by the California Division of Oil, Gas, and Geothermal Resources, or in the *GRC Bulletin (GRC)*, published by the Geothermal Resources Council. There is a 1976 excerpt (published in 1980) from an ICE publication by Dr. Mainieri; an excerpt from a 2010 paper he authored for the IGA, *Costa Rica Country Update Report*; and a financial comment taken from an issue of the *Central American Report*.

Now, to begin.

**1980:** “The zone of La Fortuna-La Union-Hornillas on the slopes of the volcano, Miravalles, was named in the [Rogers and GeothermEx] report [prepared for ICE] as the most promising area in which to search for geothermal resources commercially exploitable for the generation of electrical energy. The report mentioned the need to drill four exploratory wells, 1000 meters in depth, to determine the existence of a geothermal reservoir; and to evaluate its physical, chemical, and thermodynamic characteristics.” **1976 ICE publication by Dr. Mainieri, *GHL, 1980; translated by S.F. Hodgson***

**1981:** “The first well drilled at Las Hornillas de Miravalles [the original field name] was well PGM-1. Well PGM-2 was completed in January 1980 and a field reservoir evaluation is underway. Results of the study will determine the size of the first generating unit and the number of wells to be drilled in the next few years.” **Dr. Mainieri, *GHL***

**1983:** “When Costa Rica’s first geothermal plant goes on line in 1987, 15 percent of the country’s installed electricity will be generated from geothermal energy. Still, I suppose a great many Costa Ricans have not heard of geothermal energy.” **Dr. Mainieri, *GHL***

**1985:** “The power plant for Miravalles Geothermal Field, a 55 megawatt single-flash unit, is scheduled to be constructed and operating by the early 1990s. We are doing everything we can to ensure it will be an efficient plant.” **Dr. Mainieri, *per Ing. Manuel Corrales, Chief of ICE’s Electric Planning Directorate, GHL***

**1986:** Costa Rican President Óscar Arias’ government presented a loan proposal to the legislature that would require Costa Rica to guarantee two loans—one from the Inter-American Development Bank and one from the Japanese Overseas Economic Fund. “The monies would be used to construct the power plants at Miravalles Geothermal Field.” ***Central American Report, GHL***

**1988:** “The first power plant will be funded with a loan from the Japanese Overseas Economic Fund. The second power plant will be financed solely by a loan from the Inter-American Development Bank. The first power plant is scheduled to come on line in January 1991.” **Dr. Mainieri, *GHL***

**1991:** “I support the development of Costa Rica’s geothermal resources at Miravalles Geothermal Field,” former Costa Rican President Dr. Óscar Arias told me one evening in Davis, California—while explaining his position on alternative energy sources. Perhaps his country’s continuing success at Miravalles brought the geothermal field to mind. In a few years, Dr. Arias would win his second presidential term: 2006-2010, and the Nobel Peace Prize: 2007. Miravalles, of course, continued on its path to successful development. **President Óscar Arias, *GHL***

**1991:** “We are finalizing the bid-judging process and will soon purchase electrical-generation equipment for Power Plant Unit 1 in Miravalles Geothermal Field,” Dr. Mainieri said. “This is a 55 megawatt, single-flash power plant with only one turbine. We are funded and ready to start construction. The power plant is scheduled to go on line during the first half of 1994.

“Power Plant Unit 2 will be added onto the southern side of Unit 1. Unit 2 will be a 55 megawatt, single-flash unit that is scheduled to be completed in 1995. The solicitation documents for constructing and equipping Unit 2 will be published at the end of 1991.” **Dr. Mainieri, *GHL***

**2010:** “From 1991 to 2010, great geothermal progress was made in Costa Rica at Miravalles Field,” Dr. Mainieri said. “Power Plant Unit 1, 55 megawatts, went on line in 1994; Unit 2, 55 megawatts, in 1998; and Unit 3, 29 megawatts, in 2000.”

In 2010, as work continued at Miravalles Field, development began at two geothermal fields to the northwest: Las Pailas (the first 41 megawatt power plant was under construction) and Borinquen (the first plant feasibility studies were underway).

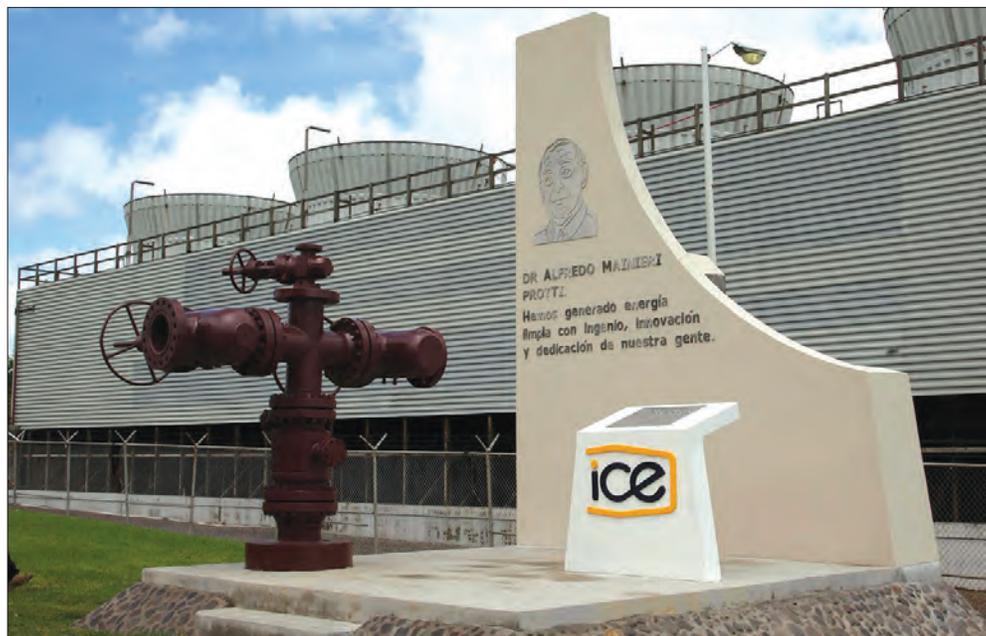
Dr. Mainieri oversaw it all, always caring deeply about the environmental and the socio-economic aspects of geothermal areas and insisting on environmental sensitivity. At Miravalles, environmental monitoring began in 1987 and the *Environmental Impact Assessment (EIA)* made for Miravalles Geothermal Field in 1998 was the first of its kind in the nation (Guido-Sequeira, 2010).

In 2010, I asked Dr. Mainieri how to explain the success of Costa Rica’s geothermal development. He said it was because, from the beginning, the

country based what it did on scientific findings. He failed to mention that he had helped to make this decision and had personally made or overseen many geothermal choices through the years. Dr. Mainieri passed away in 2013. *GRC, IGA*

### Posthumous Award Ceremonies

On July 7, 2017, at the foot of Miravalles volcano, Dr. Mainieri's wife, Elizabeth Mora, unveiled a monument in honor of his geothermal work for ICE and his country. During the ceremony, the name of the geothermal field was changed officially to the *Campo Geotérmico Alfredo Mainieri Protti*. The monument stands in front of Miravalles Power Plant Unit 3—with a wellhead placed carefully at its side.



The memorial monument, with a portrait and an inscription, stands in front of Power Plant Unit 3 in the Campo Geotérmico Alfredo Mainieri Protti. *Photo reprinted with permission of Periódico Mensaje, Heraldo de la Región Chorotega*

Included on the monument are a portrait of Dr. Mainieri and a short quotation in his own words: *Hemos generado energía limpia con ingenio, innovación y dedicación de nuestra gente.* (“We have generated clean energy with ingenuity, innovation and dedication by our people.”) Portions of the ceremony are available on *YouTube*.

On October 2, 2017, at the GRC Annual Meeting in Salt Lake City, Utah, Dr. Alfredo Mainieri Protti received, *in absentia*, the *GRC Special Citation Award* “For his lifelong pioneering work and



enduring achievements in Costa Rica's geothermal power development.”



Dr. Susan Hamm hands Dr. Shigeto Yamada the award to be presented, *in absentia*, to Dr. Mainieri's family. *GRC photo*

Dr. Susan Hamm, Director of the DOE Geothermal Technology Office, presented the award to Dr. Shigeto Yamada, Chairman of the GRC Honors and Awards Committee, who accepted it on behalf of Dr. Mainieri and his family.

### One Last Geothermal Thing

San Miguel de Sarapiquí is a small Costa Rican town on the northern flank of Poás, an active volcano. The Sarapiquí River flows along the eastern edge of the town. Dr. Mainieri and I often talked about San Miguel because I had lived there for two years and he and his family had vacationed there. He said ICE geologists found geothermal waters bubbling into the Sarapiquí River as it flows by San Miguel. In case this geothermal matter may have been forgotten, it is mentioned here.



Looking north down the main street of San Miguel de Sarapiquí in the late 1960s. Here on clear days, the green hills of Nicaragua appear along the horizon. The bed of the Sarapiquí River, unseen in the photo and beyond the houses, parallels the right-hand side of the street. *Photo by S.F. Hodgson* ■