

100 Years of the Power Plant in Laguarda

In 1914 Mr. Juan Urrutia Zulueta was visiting Laguarda, staying at Casa Cudillo. He was the representative of the company HIDROELÉCTRICA IBÉRICA #. He was on a work visit, following conversations held with Mr. José Villacampa and his objective was the construction of a high voltage line which would connect the projected hydroelectric power plants of the Cinca River basin, with the industrial zone of Bilbao, which was in full development and would soon need cheap electricity. The distance to cover was more than 400 km: a challenge for the time ¥. The best path for this line (the same which currently exists) passed through Laguarda, and therefore prior authorization from the affected owners was required.

The Project was explained during a meeting in Casa Cudillo (Villacampa). It was difficult to convey what electricity exactly was, because more than 100 years ago people knew only candles, torches, or oil lamps. Therefore the room was darkened and a demonstration was given with a dynamo mounted in a wooden box complemented with two light bulbs which would illuminate when the dynamo was turned. It was an afternoon full of magic and science, full of wonder and questions that were answered.

The Society of Owners of Laguarda, explained that there was no problem to place the poles and facilities in the fields and mountains of the village. However as compensation they also wanted the so-called “bujías” (light bulbs) in their houses to light up the night. It had to be explained to them that it was not possible to connect 125 Volt light bulbs to a high voltage line. The high voltage meant a lot of power and it would be very expensive to transform the energy of the line to make it suitable for a small village.

The members present failed to understand how people in Bilbao would enjoy lighting and not the people in Laguarda. After several negotiations, in which Mr. José Villacampa mediated, an agreement was reached. The company would design a small hydroelectric power plant for the locality and they would also help with the purchase of materials. The Society of Owners of Laguarda would provide labor and make up for the rest of the cost.

The following year, in September 1915, two “maestros de electricidad” were staying again at Casa Cudillo. They came to study the discharge of the local rivers in the dry season.

The initial idea was to use the local mill (next to the barranco de San Salvador) and its pond for the new installations. But the idea was abandoned because the difference in height was very small (15 m), too small to move the turbine. As an alternative it was decided that the optimal solution would be to collect the irrigation water from the barranco de San Salvador, build a small pond and from there pipe the water down to the plant, with a drop of 100 m and a slope of 80 %.

All this information was brought together and in Bilbao written into a Project. Een engineer of the company presented the Project to the Society of Owners on 10 May of the year 1916. The Board of the Society met in the Casa del Concello de Laguarda and the engineer gave the necessary explanations and after several days of work on site, took note of the proposed modifications.

To supply the power plant, water is taken from the irrigation ditch of the Barranco de San Salvador (then called Sancristomo). From there it went down with an inclination of 5% to a site called LA CUCULERA, next to the path to FISCAL. Back then there was an iron plate (or bronze according to some), which was percussed to give signals to the people. The Cudillo family (Mr. José Villacampa) donated to the Owners Society a small orchard where the pond would be dug, a bit lower than the existing ditch.

The mill pond consisted (just like today) of a stone wall about 8 m tall, oriented to the south. It has two outlets. One is the overflow drain at the top of the wall. The other is situated 1 m above the bottom (currently at the bottom): it is the intake for the pressure pipe.

The pressure pipe — originally made of metal, later on replaced by fiber (asbestos?) cement) — passed through a property which had belonged to Casa Chantre, and was recently (1912) acquired by Martina Zamora from Casa Lorente. Their authorization for the passage of the pipe was requested, and being granted and the land for the installation of the pipes donated. The pipeline ended where the central was planned, on a terrain belonging to Casa Cudillo (D. José Villacampa). This terrain was also ceded to the Society of Owners.

At some point in the Barranco de San Salvador there existed already a branch in the irrigation system. The water was sent one way to irrigate the "artales" of Cudillo and to the other way to the pond of the mill of the same family. For this reason, the overflow from the power plant was incorporated into this system. This system disappeared when the modern road was built in 1933. The old road to Cañardo and San Urbez was heightened to the level of the new road and a bridge over the Barranco de San Salvador was built. This meant that the water supply channel to the mill pond and to the irrigation system of the "artales" had to be changed with a new, and still existing, passage under the road.

The new system was mixed — as it still is today. The pond is filled during the day and at night this volume is used to produce electricity. The overflow, once the pond is full, is then used for irrigation. There was a connection with the ditch for irrigation, which came from the source of the river Guarga, about 800 m away from the pond. Nowadays this ditch belongs to the municipal council and feeds the deposit for the drinking water of Laguarda. The connection between both systems is severed.

The Engineer and all who came on site were amazed at the elaborated system of ditches, which irrigated the surroundings of the village and into which the new electricity production would be integrated. It was the perfect system which would be able to reconcile irrigation, electricity production, and other applications.

The owners agreed unanimously that the construction of the Power Plant and the complementary services would be carried out. To make execution of the plan possible, several things were agreed upon. The Cudillo and Lorente families would contribute the necessary terrain. In order to buy machinery and accessories (wire and mechanical parts) Mr. José Villacampa (Casa Cudillo) and Mrs. Martina Zamora (Casa Lorente), on behalf of their families, promised to contribute 960 pesetas each $\frac{1}{2}$. According to the agreement reached with Mr. José Villacampa the contribution of the Compañía Energías del Norte who would pay the project study, technicians and the rest of the commitment, was 3,000 pesetas.

There was more, however. The poles for the lines were cut on the terrains of members of the Society of Owners. They also made the smithy available and provide the blacksmith, the carpenter, the mason and the necessary materials. Cast iron parts and fittings, and pieces made of wood or stone, were all to be manufactured in Laguarda. An example of sustainable management.

At that time, the Society of Owners counted 15 participants (the same as now): three of the Cudillo family, two of the Lorente family and another 10 corresponding to different families in the town.

There were however two families living in Laguarda, who were not a member of the Society of Owners. They were therefore not entitled to electricity in their homes. The Cudillo family resolved this problem in ceding two shares of the Society to these families. But they reserved the right to use electricity proportional to their initial contribution. This right would be maintained from the beginning and would be repeated in the public deed of the Society in 1959.

The twelve families who had not made an economic contribution, and neither donated terrain, were required to carry out labor in compensation: improvement of the ditch, the intake, the pond, building the construction which would hold the turbine, laying of power lines to each house, etc.

After the meeting, the Project was officially presented in Huesca, in July of that same year, to obtain the necessary official permits. But there was a problem. The Sociedad de Propietarios has been an association under Aragonese law (derecho foral Aragónés) since time immemorial and did not exist before the Spanish Treasury until 1959. It was therefore necessary that a real person presented the documentation. This task came to Mr. José Villacampa de Casa Cudillo, who became the "President/Administrator" and official representative of the Society. The situation stayed that way for many years until the last time the contribution was paid to the Treasury.

In December 1917, after numerous negotiations, all the necessary permits were obtained. Work began in the spring of 1918, starting with the improvement of the irrigation channel, the pond, the construction of the shed and erection of the posts.

In March, the packages with all the machinery coming from Zaragoza arrived at the ORNA Railway Station, then recently put in service. From there everything was hauled on horseback throughout the GUARGUERA to Laguarda. Early April, the two "masters of electricity" would return to the village to direct the assembly and teach the operation to the inhabitants.

It took just over a month to assemble the pipes, to build the power station, to hang the copper wire lines on the poles and the light points in each house. The machinery was made in 1917 at the foundry EBRO § in Zaragoza and was labeled "Ebro 125".

The electric generator was a model from the AEG factory brought from Germany. The generator ran at 1400 revolutions/minute and originally generated 230 V, which at 16.5 A gave a power of 3.8 kW. The original voltage was transformed down to 150/125 V at the output. The regulator allowed a maximum output of 150 V, which dropped to 125 V in the houses due to the resistance of the unprotected copper line.

The work was finished on May 18th, and in the following days the customers were connected to the grid. A total of the 15 aforementioned houses, plus the barracks of the Guardia Civil, the home of the Secretary, the home of the school master, the school, the abbey, and the municipal offices.

This gave a total of 100 light bulbs in the village, plus 2 in the power station itself (outside and inside the building). In the initial layout of 1918, Casa Cudillo and Casa Lorente had a total of 12 bulbs each (in accordance of the agreement) and the rest of the houses of owners each 5. Leaving a total of 16 light points for those who were not from the Society. This configuration would change over time due to changes in the requirements (f.e. more light bulbs, public lighting) †.

On May 24th, 1918, the official inauguration takes place and the installations are blessed by the priest. All families, representatives of donor companies and friends are present. A large bonfire was lit at all the crossroads (Albella San Urbez, Matidero, Cañardo, Secorún ...), and in front of the current Casa Cudillo where the garage was built in 1933. Stew with boliches (a old vegetable similar to a small white bean, still grown in some places) are prepared, lambs are roasted, the wine flows and there are cakes. All paid for by the Society, that is to say, by everyone. There was a lot of joy.

Around 9:00 p.m., the grid was officially connected and as a demonstration people were allowed to light 4 bulbs per house. A test carried out some days earlier had shown that if more than 100 bulbs were switched on then the fuses of the central would blow.

After the inauguration, the news spread and during the next days, people of the region would come to Laguarda to witness the arrival of modern times with their own eyes.

To ensure correct operation, a fuse was installed in each house, which would jump if all bulbs in that house were switched on at the same time. In Casa de Cudillo and Lorente the limit was 400 W, in the rest of the 12 houses 150 W and in the others 100 W each ¶. Which added up to a maximum theoretical power of 3.1 kW. But many times there were problems and the system need continual

adjustment, because there was not enough water to reach the maximum possible production. A kind of guardia de luces (guard of the lights) was in charge of this. This so called lucero was appointed by the Owners Society and he was responsible for the control of the production system, supply, surveillance ...

Initially, after their investment, the members of the Society did not pay for their consumption, but they had to do work on a rotational basis for the maintenance of the ditch, the pond, the power house, the lines. The money collected from non-members (they paid twice a year) was allocated to a fund for repairs. Everything was meticulously regulated and it stayed this way until approximately 1959.

With the pond full and a maximum consumption of 2.5 kW, there was in principle enough water for four hours of lighting. Then, if there was a need for more, the irrigation water could be redirected. This meant that in winter there was electricity until 10 in the night and in summer until 12 at night, all depending the amount of water available. If the ditches were adjusted, this period could be lengthened a bit, but then with less power.

Management of the system was carried out directly by the Society of Owners until 1959. In that year the responsibility was delegated to the village council of Laguarda, who then became in charge of the distribution, the repairs, and the collection of the contributions.

In 1942, in the night of August 28/29, there was an extraordinary rainfall that, which caused a great flood. The barranco of San Salvador inundated, the powerhouse was destroyed, and the generator ended in the river bed unserviceable. It was back to the beginning and invest money and work, and repair the generator in order to restore the system to its original state. (The attached photograph in the Spanish original, showing the plate of the AEG generator, stems from that time.)

Laguarda was without electricity for a month and once it was repaired, in time for the Pilar (that is October 12th) of 1942, production was started again and celebrated. Since then the generator has undergone continuous repairs and needed to be rewound 16 times, the last time in 2011.

The Power Plant started up precariously, but it stayed in use until 2006. After years of struggle Laguarda could be connected to the wider grid and light came from then on at 220 V like everywhere else. It is ironic that we, being pioneers in electricity, ended up one of the last villages connected to the grid.

In 2010, an agreement was signed whereby the Sociedad de Propietarios ceded the use of the former hydroelectric power station to the Sabiñánigo City Council for 25 years for patrimonial, informative, and tourism purposes. The City Council of Sabiñánigo obtained a subsidy from Leader funds (Adecuara Local Action Group), in agreement with the Provincial Council of Huesca. The equipment, the building, the pipes were restored and an informative panel was placed at the path giving access to the central. The Society of Owners had to maintain the catchment, the ditch and the pond, as well as the irrigation network.

On October 2, 2013, something similar to 1942 happened, heavy rains and large floods. As a result, the intake was destroyed, the entrance to the pond and the ditches also. The Barranco de San Salvador changed its course. Much damage everywhere. Step by step the Neighborhood Association and the Society of Owners worked together to get everything in working order again: working parties, small investments, contributing funds from the Society. The intake, the pond and the ditches run as before, and we always keep the pond full, so that it can be used for irrigation and for informative and educational purposes.

In 1927 the official map was made for the Army by the Instituto Geográfico Nacional of Spain, which served as the basis for all subsequent official cartography. The FABRICA DE ELECTRICIDAD DE LAGUARTA was then included in the official cartography and it remained so until 1989. In 1983 it was officially registered as a hydroelectric power plant in the Ministry of Treasury and Industry.

Hunderd years have passed since May 24th, 1918, when the power plant was officially inaugurated.

Pedro M. Marín Casanova

- SOCIEDAD DE PROPIETARIOS DE LAGUARTA (SABIÑANIGO)

Original text in Spanish at:

<https://www.laguarta.es/2018/05/100-anos-de-central-electrica-en.html> accessed 26.x.2021

HIDROELÉCTRICA IBÉRICA was founded on July 19, 1901 for the production, transportation and supply of electrical energy in the Basque Country. In 1922, after having obtained new concessions on the Cinca and Cinqueta rivers, it put the first group of the hydroelectric plant in Lafortunada into operation.

¥ HIDROELÉCTRICA IBÉRICA had been the first company to adopt 30,000 volt voltage for its energy transmission lines and in 1923 the first to use the 132,000 volt voltage in Europe, after putting the transmission line from Lafortunada to Bilbao into service.

§ The full name is S.A. MAQUINISTA Y FUNDICIONES DEL EBRO. The company was founded under the name SOCIEDAD BRESSEL Y PELLEGERO in 1911 in response to the needs of the sugar industry. The founders were Alberto Bressel (German nationality) and José Pellejero. The name was changed in 1918. The company ended its activities in 1989.

† NUEVA ESPAÑA in its edition of 19.xi.1977 publishes a list of *las centrales eléctricas del Altoaragón* and gives their capacity in the year 1976. The plant of Laguarda is listed with a power of 8 kW.

‡ If we take into account the average wage in Spain of the time (2 Eurocents) compared with the average wage in 2021 (113.77 Euro) and taking an exchange rate of 1 Euro = 166.386 Pesetas (2002), then this investment of 960 Ptas is the equivalent of nearly 33 000 Euro today. In my opinion those families must have been very rich.

The data are based on:

Leandro Prados-de-la-Escosura , "What Was Spain's GDP Then?" MeasuringWorth, 2023

URL: <http://www.measuringworth.org/spaingdp/> visited on 01.vii.2023

¶ The bulbs which were used consumed 40 W probably. That was a common type at the time.