

## Hulleras del Norte S. A. (HUNOSA)

Hulleras del Norte S. A. (HUNOSA) is a mining company operating underground coal mines in the Nalón and Caudal basins in Asturias, northern Spain, and also owns a circulating fluidized bed power station in the area. The skills deployed by HUNOSA concern mining engineering, drilling engineering, geology, safety engineering, gas monitoring, and mine closure related issues. In addition several research and development projects related to underground coal production have been undertaken by the company. HUNOSA has participated in many projects under the RFCS/ECSC program including FLOMINET and WATERCHEM.



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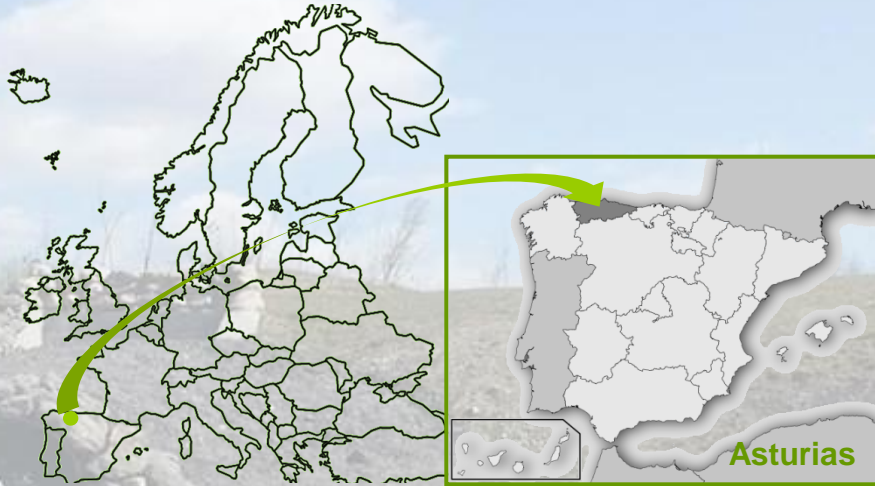
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## Pilot action in Asturias (ES)



The idea of pilot action in Asturias is development and testing the geothermal installations which is focused on defining the thermal behavior of the shaft, exchangers and in general the performance of each kind of project that takes advantage of a geothermal resource.



PILOT ACTION IN ASTURIAS (ES)

Progress so far:

- Data Collecting in the Barredo Shaft



FAEN



Hospital



University



Installation parts:

- Open-loop circuit (mining water),
- Closed-loop circuit (regular water).

Parameters:

- Temperature,
- Water flow,
- Electrical Power,
- COP, EER and PF



Installation parts:

- Open-loop circuit (mining water),
- Closed-loop circuit (regular water).

Settings:

- Temperature,
- Pressure,
- Water flow.



Main results:

- Collection and storage of data from seasonal measurement of temperatures and water level into the shaft. (Autumn-Winter and Spring-Summer).
- Identification of the best idea to carry out construction of a dam to lead mountain-mine water to the shaft.
- Collection and storage of data from testing and monitoring of both systems (Barredo-Hospital and Barredo-University).

Future work to be undertaken:

- The following activities are planned to be performed in the future:
- Continuation of data collection,
- Water injection into Barredo shaft using a tanker truck,
- Preparing the report on benefits/cots and energy efficiency.

