# PISCO2 Project

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## Co-financed by the European Union

### European Energy Programme for Recovery

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## Background

The Fundación Ciudad de la Energía (CIUDEN) is a state-owned, public R&D institution created by the Spanish Government in 2006. It was conceived to foster economic and social development in Spain's El Bierzo district through activities relating to the Energy and Environment sectors.

By carrying out collaborative research in Carbon Capture and Storage (CCS), CIUDEN contributes to strengthening the industrial and technological base in Spain and Europe.

The project OXY-CFB-300 of CIUDEN is funded by the European Energy Programme of Recovery and its first phase has been granted with 180M€.


CIUDEN´s Facilities

General view of the PISCO2 facility

## The PISCO2 project

The PISCO2 project is an experimental facility for the investigation of the influence of $CO_2$ injection in soils on different biotopes.

The facility is located in the Technological Development Centre (TDC) of $CO_2$ Capture Programme of the Foundation (es.$CO_2$) in Cubillos del Sil, León (Spain).

The main objective of this research is to develop economical and ecological biomonitoring tools for safety control of $CO_2$ geological storage.

The studies of the influence of $CO_2$ on the biosphere have been commonly developed in natural analogues. However, in these systems, the biota is exposed to $CO_2$ for long periods of time leading to the occurrence of adapted species. In contrast, in the PISCO2 project, the effects on non-adapted flora and fauna will be tested.

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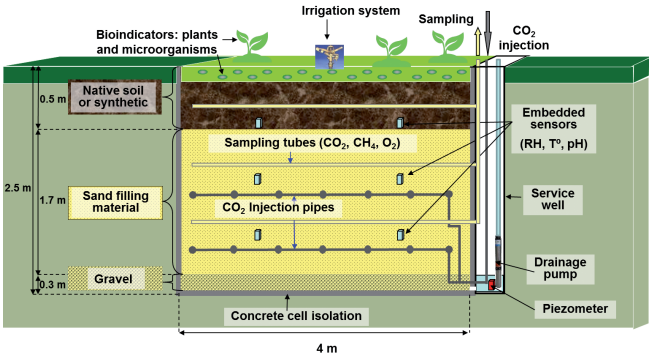
## Technical description

The Test Site for $CO_2$ Injection in Soils (known as PISCO2, after its Spanish acronym) consists of 18 cells of concrete, excavated in the ground, each one of which will have an area of 16 square meters and a depth of 2.5 meters.




Sketch of the experimental cells of the PISCO2 Project

The cells will be equipped with (i) systems for controlled $CO_2$ injection at different depths; (ii) systems for sampling groundwater and gases ($CO_2$, $CH_4$, $O_2$) and (iii) for continuous monitoring different parameters, such as water content, pH, $CO_2$ flux, microbiological, botanical, and geochemical alterations.

All the monitoring systems will be designed for online use in order to be remotely controlled.

Cell filled with gravel and sand

The cells will be filled with soils from different parts of Spain including Hontomín (Burgos), where CIUDEN´s $CO_2$ Storage Technological Development Plant is under development, although the facility can be adapted to host a variety of scientific experiments.

The facility is planned to be fully operational in December 2011. Its configuration makes it unique and suitable for international R&D programs. CIUDEN is open for cooperative research projects with institutions all over the world.

## Objectives

- Development of economical and ecological biomonitoring tools for $CO_2$ leakage at wide areas.
- Testing and (if possible) elaboration of new measure equipments and methodologies.
- Serving as a laboratory for agricultural tests of the beneficial effects of low $CO_2$ emissions.

## Research plan

**2011.** Calibration experiments
Ensure the homogeneous $CO_2$ flow in the surface.
Calibration modelling
Check the good experiment/modelling agreement.

**2012.** Biological experiments
Cultivation of plants, lichens, microorganisms.
Reactive transport modelling
Simulation of the biogeochemical processes during the $CO_2$ multiphase migration.
Ecological monitoring
Identification of native and non-native bioindicators of $CO_2$ leakage.

**2013.** Atmospheric dispersion
Simulation/monitoring of the $CO_2$ migration in the soil/atmosphere interface.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