

Showing the community, government regulators and industry that the geosequestration project is running according to plan is a high priority for CO₂CRC.

In order to do this we have put in place a monitoring program that involves the regular testing of the soil, groundwater, air and subsurface for changes in the carbon dioxide (CO₂) content. These monitoring activities are outlined below.

Monitoring the soil

Soil gas sampling aims to evaluate the gases associated with natural gas deposits including naturally occurring CO₂, hydrocarbons such as methane, and oxygen and nitrogen.

During the survey, researchers will evaluate naturally occurring CO₂, methane, oxygen and nitrogen, which are the usual gases found near CO₂ sources. This work will provide CO₂CRC with a baseline against which researchers can compare the soil tests that will be undertaken throughout the CO₂CRC Otway Project and identify any changes to the soil gas chemistry that may take place.

There could be a number of reasons for changes to the soil gas levels. The baseline surveys undertaken by CO₂CRC would enable us to identify the reason for those changes. Nirranda has a variable geology that includes limestone, sand dune, swamp/lake and river sedimentary deposits. Each geological variation results in the production of different soil and soil gas chemistry, which in turn affects the biology and productivity of the area.

Soil gases will also differ depending on climatic conditions. For example, warmer conditions lead to enhanced biological production and in time increased concentrations of CO₂ in the soil. The application of fertiliser to a paddock will have a similar effect. The survey will also detect any gases from deeper natural gas sources including natural hydrocarbons and CO₂.

The baseline soil sampling will cover the immediate area where the CO₂ will be injected and areas where CO₂ has naturally accumulated in the past and is currently stored. The soil gas surveys will continue throughout the life of the project.

Monitoring the water

As part of the monitoring program, CO₂CRC researchers will sample and analyse the groundwater in wells, both public and private, in and around the pilot project area, throughout the life of the project.

The groundwater tests have the same objective as the soil gas surveys: to identify the baseline or current levels of CO₂ in the water and monitor those levels for the life of the project.

As with the soil gas surveys, CO₂CRC will investigate the cause of any changes to the composition of the groundwater. Reasons for such changes include seasonal variation, climate, drought or high rainfall, landuse and geology.

CO₂CRC will provide the results of the tests to landowners. They are being carried out in cooperation with the Warrnambool office of Southern Rural Water.

Monitoring the air

CO₂CRC has set up an atmospheric or air monitoring program that, like the soil gas surveys and the groundwater sampling, will record baseline or current levels of CO₂ in the air.

The monitoring is planned to start well before operations begin and will continue through the life of the project. It will take place at the CO₂ source well (Buttress) and at the storage reservoir site at the Naylor-1 well.

Funded by the Australian Government, the atmospheric monitoring program is one of the most advanced of its kind in the world.

As with the other monitoring activities, CO₂CRC will investigate the cause of any changes to the composition of the air. The atmospheric CO₂ levels will be used to confirm monitoring that will take place below the surface, scheduled to begin later in the project.

Monitoring the storage site

Deep subsurface monitoring of the storage reservoir complements air, soil and groundwater monitoring.

It is through physical and chemical subsurface monitoring that researchers will obtain an accurate picture of the CO₂ and be able to confirm that the storage site is secure and not leaking.

CO₂CRC has two wells accessing the storage reservoir. One well for injecting the CO₂ (CRC 1) and another (Naylor 1) is dedicated to monitoring the physical and chemical makeup of the reservoir.

The chemical (also known as geochemical) make-up of the water in the monitoring well (Naylor 1) will tell researchers when the CO₂ arrives in this depleted natural gas well.

The other subsurface monitoring technique used at the storage site is geophysical. It primarily consists of seismic surveys. This technique uses a vibrating, truck-mounted weight and sensors that produce a three-dimensional picture of the CO₂ and the rocks that contain it in the subsurface.

Seismic activities are expected to occur in 2008, 2009 and 2010.