

CASE STUDY

University of Wyoming's Center for Economic Geology Research



Customer Overview

University of Wyoming's (UW) Center for Economic Geology Research (CEGR) studies all ways to use geology to benefit Wyoming's people. CEGR's research scientists collaborate with local industries and all levels of government to explore and develop opportunities to use Wyoming's distinctive geology and resources to diversify Wyoming's economy, and to maintain competitiveness in a low-carbon energy future.

"Field data collection was in serious need of automation and my group views your sensor solution as nothing short of magical. The result has been an unequivocal success."

**– Charles Nye, UW CEGR
(Research Scientist)**

Challenge

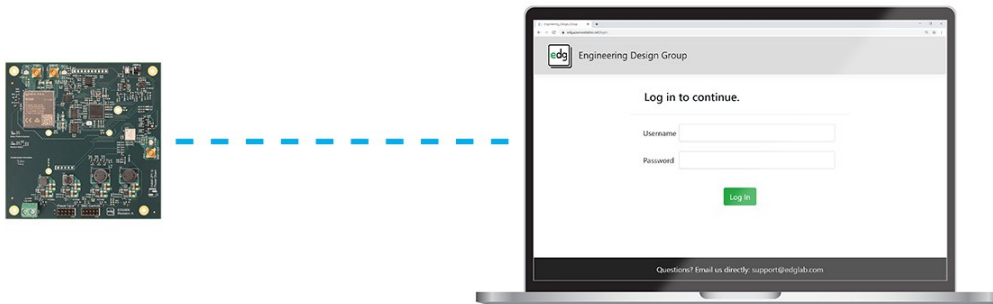
Researchers at UW's CEGR are exploring the feasibility and safety of CO₂ sequestration. In CO₂ sequestration CO₂ is injected deep underground where natural geology prevents the CO₂ from escaping back to the surface. To provide assurance that CO₂ has not escaped, CEGR researchers need a baseline of CO₂ measurements at Dry Fork Station (Gillette, Wyoming) to compare to future readings if the area becomes a CO₂ sequestration site.

"EDG made it manageable to meet this project's requirements by designing a compact electronics package that was capable of self diagnosis and remote transmission."

**– Ben Flickinger,
Earth Platform Systems, LLC**

In the baseline research project, the goal was to setup eight CO₂ monitoring locations at Dry Fork Station (Gillette, Wyoming). In a traditional research approach, a geologist would need to visit each of the eight sites on a weekly basis to manually record the CO₂ reading. This would require weekly scheduling with site operators at Dry Fork Station, regular travel to and from the site location, and manual CO₂ readings which suffer from human error, drifts in methodology, and other inconsistencies.

CEGR's challenge was to automate the CO₂ readings using wireless technologies, thereby increasing the number of readings per week, eliminating user error, and saving valuable time and money by reducing traveling to and from the field sites at Dry Fork Station. If the solution could be powered using solar power, the complete solution would be wireless, and minimize disturbance at the field sites.



Solution

UW CEGR research scientists, in partnership with local integration company, Earth Platform Systems, LLC (EPS), leveraged Engineering Design Group's IoT platform to create a fully automated and wireless network of distributed systems. These systems enable CEGR research scientists to monitor all CO₂ field sites from their offices.

Each EDG controller follows an hourly sampling cycle, which begins by bringing the system out of a low-power mode. Next, the controller turns on a gas sample pump, and after an appropriate delay, reads a local CO₂ sensor. Sensor data is transmitted to the EDG Client Portal along with environmental data, battery state, and system heartbeat information.

Transmitted data is immediately made available to UW CEGR research scientists, EPS, and their research partners through the EDG Client Portal web application which is included as part of EDG's IoT Platform. User role assignments within the application allow CEGR's team to assign meaningful names to individual systems and groups of systems while research partners are limited to read-only access.

Power for each system is regulated by EDG's smart-battery charger which sources power from a solar panel and lithium ion battery. EDG's controller provides cellular connectivity over LTE Cat-M1 and Cat-NB1 (NB-IoT), and uses modern technology to ensure transmissions occur over the strongest network carrier available at the installation site.

Why Engineering Design Group?

EDG's devices and services provide a short time-to-market opportunity for teams who need a secure, scalable, and robust solution for distributed sensor monitoring.

- **Lifetime security updates** are deployed automatically to EDG devices with no user intervention and no application interruptions.
- **Scalable:** Monitor any number of systems using the EDG Client Portal web application. Add additional systems to the device network at any time.
- **Robust:** EDG's technologies are designed and manufactured in the USA.
- **Rapid field deployments** with plug-and-play sensor detection

Our complete field-to-cloud solution eliminates the steep barrier of designing a secure, scalable, and robust IoT solution from the bottom-up. Our hardware works directly with our web portal to allow our customers to focus on growing their businesses while EDG handles the heavy lifting.

Applications

- Asset management
- Data logging
- Predictive maintenance
- Remote monitoring

Industries

- Industrial Machinery
- Manufacturing
- Mining
- Natural Gas
- Renewable Energy
- Science and Research



EDG's Cellular Controller and Smart Battery Charger