

Responsible technology for energy, environment

Environmental watchdogs call for a 'SLO'-down



Michelle Venus

Colorado's energy economy focuses on both renewables and oil and gas. And while natural gas is king in Colorado, research universities in the state are finding new ways to make oil and gas extraction more environmentally friendly while at the same time promoting renewables.

Ask Doug Johnson, vice president of the Fort Collins-based Rocky Mountain Innosphere, to discuss the social license to operate (SLO), and he leans in.

OptiEnz Sensors utilizes fiber optics coated with specific enzymes to measure the concentration levels of organic chemicals in different solutions. The enzyme 'recognizes' whichever chemical it is tied to and then transmits that data through the fiber optic cable back to specially designed hardware. Courtesy OptiEnz Sensors LLC

and gas development? And how do you do it in a way that's reflective of the values of the community you're doing business in?"

"We talk about that a lot here," he said. "It's the marriage of community responsibility with energy exploration. How do you encourage responsible oil

Community watchdogs and environmentalists have a different take on the concept. Jason Bane, director of communications at Boulder-based Western Resource Advocates, says the social license to operate – at this point – means energy companies need to simply slow down until important questions are answered.

For everyone involved, the path forward likely lies with technology. As the energy boom pushes production closer and closer to communities, environmental and health concerns are on the rise and energy companies are keen to find solutions. Three start-ups at Innosphere are betting that their technologies will succeed because they will help companies operate in a manner that reduces their environmental impact, increases their efficiency and allays the health concerns of nearby communities.

OptiEnz Sensors

Founded by Colorado State University professor Ken Reardon and Steve Witt, an electrical engineer with research-and-development roots at Hewlett-Packard, OptiEnz Sensors LLC utilizes fiber optics coated with specific enzymes to measure the concentration levels of organic chemicals in different solutions.

The enzyme 'recognizes' whichever chemical it is tied to and then transmits that data through the fiber optic cable back to specially designed hardware. Multiple sensor tips coated with different enzymes allow for testing of many different contaminants.

For the fossil fuel industry, this means real-time, continuous, on-site monitoring of water in wells, rivers and lakes, as well as tracking the water used for extraction processes such as fracking. As soon as a problem is discovered, it can be attended to.

“When concentrations of dangerous chemicals like benzene rise,” Reardon said, “operators can respond in minutes rather than days.”

What does that mean in terms of social license?

“Well, with fracking we don’t always know what chemicals are being used,” said Reardon. Drilling companies have their own proprietary blends. “But I do know that benzene is found in virtually all the formulations I’ve researched. It’s very toxic and highly carcinogenic, so the fact that we can detect and then measure this is very important.”

Avivid Water Technology

Last month, Avivid Technologies Group LLC, parent company to Avivid Water Technology, was granted a patent for Turbo-Coag, its water purification process. The Longmont-based company improved upon electro-coagulation, a century-old process that extracts heavy metals and chemicals from up to 500 gallons of water every minute.

“During electro-coagulation, cathodes and anodes are placed in the water,” chief executive Lockett Wood said. “We then run an electrical current through it and charged particles called ions attract (contaminant) particles in the water which sink to the bottom into a sludge that we can safely remove.”

Turbo-Coag removes up to 99 percent of contaminants and produces 90 percent less sludge than other methods. Wood said the sludge is inert and can be safely deposited in landfills or smelters. The drastic reduction in sludge output significantly reduces hauling costs.

The Turbo-Coag process cannot remove salts, so heavy brine waters need additional treatment to rid them of the salts in order to make the water usable. Clean water can be released back as ground or surface water or reused by the operators for their processes.

“Ultimately what we’d like to do — and what the industry as a whole would like — is to be able to process contaminated water so that all the chemicals and particulates and salts are removed and the water can be used for any purpose we want it for,” Wood said. “By doing that, we’ve created a very important byproduct: water.”

Especially in the arid West, Wood said, reclaimed water is highly valuable.

“Imagine if we can release cleaned water for livestock use,” he said. “Up in Wyoming’s Red Desert area, where there’s uranium mining, any amount of water we can release is going to be a very valuable asset. And that’s exactly what the uranium mines are trying to do: Give water to the

ranchers.”

Logimesh

The Logimesh technology is broken down into two parts, according to founder and CEO Bill Gillette. The first part is a small device that acts as a platform, a power source, CPU, sensor and small wireless radio. The device, called the Logimote, provides continuous real-time data about machine health for oil and gas producers and operators to better monitor their equipment in the field.

The Logimote harvests the heat produced by the engine of whatever machinery it’s monitoring and converts that into enough energy to run the device.

That’s when the second part of the system kicks in. The Logimote is equipped with software that churns through the collected data. It then wirelessly transmits what Gillette calls “smart” or actionable data back to the operator via the cloud.

Sensors attached to the Logimote can be tuned to sniff out chemical contaminants in the air, specifically volatile organic compounds and the hydrocarbons benzene, toluene, ethylbenzene and xylene that may leak from storage tanks and cause alarm in surrounding communities.

Logimesh is partnering with NASA to adopt hydrocarbon sensing technology for the International Space Station, essentially creating a canary-in-the-coal-mine monitoring system that warns when excessive levels of hydrocarbons and volatile organic compounds are present.

Moving forward

Technologies that foster SLO may be the only way to ensure ongoing energy development and, ecological and personal health and safety.

“Energy development companies need to listen and work with communities to understand their needs and concerns, and then find and develop technologies that provide solutions,” Johnson said.

Bane continues to lobby for a go-slow approach.

“There are a lot of promising technologies out there,” he said, “but we still don’t have a complete understanding of the long-term outcomes and how they might impact our economy, health and environment.”