

Application Brief: New Sky Energy

New Sky Energy Turns to Opto 22 to Sweeten Natural Gas



The United States has enjoyed many economic benefits thanks to growth in its domestic energy market, and natural gas drilling in particular. But it hasn't been easy when it comes to extracting natural gas from deep within the earth. Up to 40% of the world's natural gas reserves are estimated to be "sour," or mixed with acidic gases such as hydrogen sulfide (H₂S) and carbon dioxide (CO₂) that are highly corrosive to pipelines and equipment.

Oil and gas companies use a variety of chemical and physical technologies to remove hydrogen sulfide gas from sour gas, "sweetening" the natural gas left behind. Unfortunately, these conventional technologies are typically energy and capital intensive, difficult to automate and monitor, and inevitably produce a sulfur-based waste stream.

To address these problems New Sky Energy (Boulder, Colorado) developed an innovative, automated gas sweetening process called SulfurCycle, which reduces costs, generates useful chemical products, and allows excellent remote process control.

Remote Operations

"Natural gas wells are usually located in remote places," says Jordan Matthews, mechanical engineer for New Sky Energy. "It's not a five-minute ride from headquarters to the site—more like several hours and hundreds of miles. Without automated measurement and control of the sulfur extraction process, an operator on site would have to sample the sweetened natural gas every 15 minutes to 1 hour. Based on those readings, the operator would then determine how well the chemical scrubber is working and adjust well operations and the sweetening process accordingly. The acidic gases have to be removed as soon as possible after the natural gas is extracted from the ground because the acid content makes the gases highly corrosive to pipelines, pumps, and valves."

New Sky's two-stage, robust capture chemistry reduces automation and processing costs and improves energy efficiency. The process regenerates the capture agent onsite and produces industrially useful sulfur-based compounds and hydrogen gas. The chemical energy of the captured H₂S dramatically reduces the energy cost to regenerate the capture agent, significantly reducing both operating and disposal costs.

Monitoring temperature, pressure, tank levels, pH, heater operations, electrical loads, and other process factors is critical to SulfurCycle's success. Describing the company's successful pilot system, Matthews says the objectives of the control system are to:

- Monitor and collect meaningful data.
- Provide feedback process controls.
- Provide automatic safety shutdown capabilities.



New Sky Energy's SulfurCycle natural gas scrubbing process is automated and monitored using Opto 22's SNAP PAC System control hardware and software.

- Create a consolidated single interface for operators to remotely monitor and control the pilot process.

“New Sky recognized that automating the process is key to our long-term financial success,” Matthews explains, “so we got our foot in the door with this pilot system. The primary benefit was data collection, as we over-instrumented everything so we can learn as much as we can about our process.” Following its successful pilot project at a well site in Oklahoma, New Sky exclusively licensed its SulfurCycle technology for use in oil and gas operations in the US to a Colorado-based E&P (Exploration and Production) fund.

An Automated Solution

New Sky Energy’s automated solution uses an Opto 22 SNAP PAC System, which comprises an Opto 22 SNAP PAC programmable automation controller (PAC) that performs calculations, controls the process, and allows operators to monitor all operations from a single location; about a dozen SNAP I/O modules to receive data from various sensors and monitoring systems and automatically control electrical systems and valves; PAC Display HMI software to create and run the operator interface; and PAC Control Basic to program the PAC. Matthews considered automation solutions from other major vendors, such as Rockwell, but their software alone cost more than the entire Opto 22 solution.

Matthews is looking forward to scaling up the pilot system for its first commercial deployment in Wyoming. “We’ll go from treating 20% of the gas from a small well in Oklahoma to 100% of the gas from a large well field in Wyoming,” he says. “Opto 22 makes it very easy to scale up the system by simply adding additional I/O modules and slightly expanding the code to include all conditions.”

Expansion Plans

New Sky Energy plans to implement a similar Opto 22 control solution in its Boulder laboratories to allow the company to perform experiments overnight without technician supervision.

There’s also a good chance future commercial SulfurCycle deployments will include Opto 22’s *groov* interface, enabling technicians to securely monitor and control natural gas well operation and sweetening processes from virtually any Internet-enabled smartphone, tablet, or PC. “And not just control the well,” Matthews adds, “but also

recognize when a component or process will require future attention. Rather than reacting to a failure, we can predict when maintenance is required.” And that’s sweet indeed.

About Opto 22

Opto 22 develops and manufactures hardware and software for applications involving industrial automation and control, energy management, remote monitoring, and data acquisition. Designed and made in the U.S.A., Opto 22 products have an established reputation worldwide for ease-of-use, innovation, quality, and reliability.

Opto 22 products, including the *groov* mobile operator interface, use standard, commercially available networking and computer technologies, and are used by automation end-users, OEMs, and information technology and operations personnel in over 10,000 installations worldwide. The company was founded in 1974 and is privately held in Temecula, California, U.S.A. Opto 22 products are available through a global network of distributors and system integrators. For more information, contact Opto 22 headquarters at +1-951-695-3000 or visit www.opto22.com.