

# Increasing hydrogen purity with TDLAS/QF optical instrumentation

Measuring trace oxygen and trace moisture in downstream processes

## Invenergy

### Benefits at a glance

- **High precision measurement:** Enables 99.95% or higher hydrogen purity by accurately detecting trace levels of moisture and oxygen
- **Integrated analyzer panel:** Combines moisture and oxygen analysis in one compact system, reducing footprint and complexity
- **Optical, non-invasive technology:** Uses laser-based analysis to “look without touching,” minimizing contamination and simplifying sample handling
- **Enhanced safety:** Eliminates the need for two sample lines, reducing leak points and improving overall system safety
- **Real-time data:** Provides immediate, reliable insights for operational decisions and customer assurance
- **Versatile application:** Supports both internal uses (e.g., generator cooling) and external hydrogen sales with consistent quality monitoring



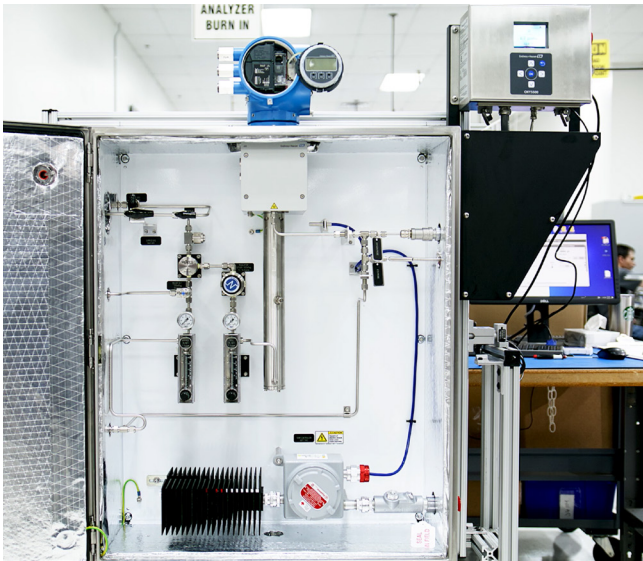
**Summary:** Headquartered in Chicago, Illinois, Invenergy is America’s largest privately held developer, owner and operator of clean energy solutions. Invenergy develops, owns and operates a diverse portfolio of energy solutions, including land-based wind, solar, natural gas power generation, transmission infrastructure and energy storage, and more.

**Challenge:** Invenergy’s Sauk Valley site in Rock Falls, Illinois, uses hydrogen for both generator cooling and fuel cell customer supply. Consistent hydrogen quality is necessary for the Invenergy team to meet the requirements of their end customers. Impurities from typical electrolysis processes like trace

moisture or trace oxygen run the risk of poisoning the catalyst or reducing overall efficiency.

Steven Lill, Manager, Thermal Engineering at Invenergy, says Invenergy needs to achieve a certain level of hydrogen purity before the company can sell to third parties. They turned to Endress+Hauser to collaborate on a solution ensuring the analyzers used in its processes were of high precision, capabilities and reliability.

“When we sell hydrogen to third parties, we need to achieve 99.95% purity, which leaves very little room for error,” said Lill.



**Our solution:** Endress+Hauser provided a cutting-edge optical analysis panel tailored for hydrogen applications. The integrated panel combined two advanced analyzers:

- J22 TDLAS gas analyzer for trace moisture detection using tunable diode laser absorption spectroscopy (TDLAS)
- OXY5500 analyzer for trace oxygen measurement using quenched fluorescence (QF)

This dual-analyzer solution offered several advantages:

- Optical, non-invasive measurement: Enabled “look without touch” analysis, consolidating the two measurements into a single sample line, reducing both the cost and the footprint of a conventional sample system
- On-site, low-maintenance: Required only periodic validation – every 30–45 days for oxygen and quarterly for water – with no factory recalibration or long “dry down” periods, keeping the unit online
- High precision and reliability: Delivered real-time, accurate data essential for hydrogen purity assurance

**Results:** Both measurements are taken optically – through lasers and lights – meaning the two analyzers can run in series of one another. This significantly reduces the cost and footprint of the two analytical measurements, as well as eliminating a sample line, which increases safety by reducing leak points in the overall system.

Through continued collaboration with Endress+Hauser, the Invenergy team is able to share accurate, real-time data that improves its ability to serve its customers. “We need to be able to trust that the analyzers that we use are high-precision, and we trust Endress+Hauser’s solution,” said Steven Lill.



[Watch a video to learn more](#)



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