

# Driving Europe's Green Hydrogen Transition with Advanced Gas Analysis

*The emergence of optical technologies has transformed safety of hydrogen production, offering greater accuracy and reliability in harsh industrial environments.*

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/EINPresswire.com/ -- Hydrogen, the simplest and most abundant element in the universe, has become a cornerstone of Europe's strategy to achieve a sustainable energy future. As

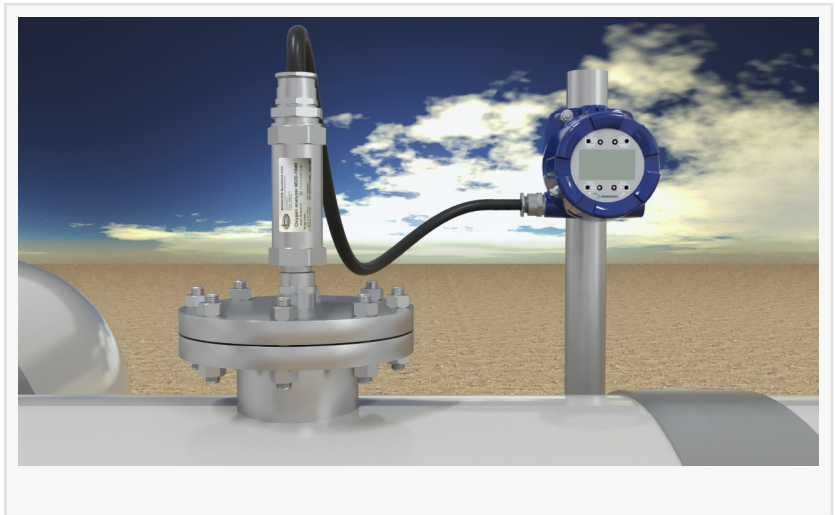
Europe ambitiously pursues its greenhouse gas (GHG) emission reduction and economic decarbonization goals, the importance of [green hydrogen](#) in this transformative journey cannot be overstated.

Green hydrogen, produced through the electrolysis of water powered by renewable energy sources such as solar, wind, and hydroelectric power, is redefining sustainability in the energy sector. This process involves splitting water into hydrogen and oxygen using advanced electrolyzers, ensuring environmental friendliness. High-purity water is fed into the electrolyzer, which contains an anode and a cathode separated by an electrolyte. Two primary types of electrolyzers dominate the industry:

- \* Alkaline Electrolyzers: Utilize a liquid alkaline electrolyte, typically potassium hydroxide.
- \* Proton Exchange Membrane (PEM) Electrolyzers: Employ a solid polymer membrane as the electrolyte.

Specialized materials, such as nickel or platinum, are used for electrodes to withstand the rigorous conditions of electrolysis. Hydrogen gas is produced at the cathode, while oxygen gas is generated at the anode. Monitoring and controlling these outputs are essential for maintaining process efficiency and safety.

Green hydrogen production demands precise monitoring of oxygen and hydrogen



concentrations at critical points throughout the process. Traditionally, methods such as sample extraction and venting have been used, which can compromise safety and environmental integrity. The integration of advanced in-situ gas analyzers has revolutionized this approach, enabling real-time monitoring directly within the process stream.

Key measurement points in hydrogen production include:

- \* Anode Outlet: Monitoring oxygen production to ensure safe collection and management.
- \* Cathode Outlet: Assessing hydrogen purity and quantity.
- \* Electrolyzer Cell Outlet: Detecting gas crossover or leaks within the cell.
- \* Gas Purification System: Verifying the effectiveness of purification before and after the system.
- \* Storage and Distribution Points: Ensuring hydrogen purity before storage or distribution.
- \* Safety Monitoring Points: Detecting leaks and preventing explosive mixtures.

The emergence of optical technologies, such as laser spectroscopy, tunable diode lasers, and quenched fluorescence, has transformed in-situ process analysis. These technologies eliminate the need for sample extraction, offering greater accuracy, reduced contamination risks, and enhanced durability in harsh industrial environments.

The [MOD-1040 Process Oxygen Analyzer](#) and [MOD-1060 Process Hydrogen Analyzer](#) exemplify these advancements:

- \* MOD-1040 Process Oxygen Analyzer: Utilizes advanced optical sensor technology to deliver precise, in-situ oxygen measurements. With low detection limits and rapid response times, it is indispensable for applications such as combustion optimization and emissions reduction.
- \* MOD-1060 Process Hydrogen Analyzer: Employs thermal conductivity principles to measure hydrogen concentrations, ensuring the safety and efficiency of hydrogen-natural gas blends. This analyzer plays a vital role as industries adopt green hydrogen to drive decarbonization.

Both analyzers are equipped with ATEX/IECEX and SIL-2 certifications, ensuring safe operation in explosion-prone environments. Their robust electronics and CPUs withstand extreme temperatures, pressure fluctuations, and hazardous gases, ensuring seamless operation in demanding industrial conditions.

\* Advantages of In-Situ Gas Analysis

\* The adoption of in-situ gas analysis offers numerous benefits:

- \* Wide Measurement Range: Suitable for diverse industrial applications.
- \* Fast Response Time: Enables real-time monitoring and swift corrective actions.
- \* High Accuracy and Precision: Delivers reliable measurements for process safety and product quality.
- \* Low Maintenance: Reduces the frequency of calibration and replacement.
- \* Versatility: Applicable across petrochemical plants, refineries, and hydrogen production facilities.
- \* Enhanced Safety: Certified for hazardous environments, minimizing risks.

- \* Operational Efficiency: Improves process control and ensures product purity.
- \* Cost Savings: Simplifies system design and reduces equipment requirements.

As the world transitions towards cleaner energy sources, green hydrogen is emerging as a game-changer in achieving sustainability. The deployment of advanced in-situ gas analyzers like the MOD-1040 and MOD-1060 ensures the safety, efficiency, and reliability of hydrogen production processes. These technological innovations not only accelerate Europe's decarbonization goals but also set a new benchmark for industrial process analysis globally.

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