

Hydrogen Plant Assessment:

A guide to improving and optimizing your operations



What you don't know could be costing you money. A plant assessment will guide your plant's future strategy for improvement through:

Optimizing production/capacity for a single plant or multiple plants

Reducing operating costs, including maximum production and minimum turndown operating efficiencies

Minimizing downtime and increasing reliability

Enhancing efficiency and productivity

Increasing safety performance

Reviewing inventory and sparing program

Extending component life, including Pressure Swing Adsorption (PSA)

Air Products is a market leader for safety, technology, innovation and operational excellence. Founded more than 75 years ago, Air Products is a \$10 billion company with operations in over 50 countries. Air Products is the world's leading third party provider of hydrogen. We operate over 100 hydrogen plants and have 1500 years of operating experience. When it comes to hydrogen, no other company has our level of operational experience and expertise. Chances are that we have already seen, and solved, issues you are having with your hydrogen plant in our own fleet. Our experience gained from years of design and operation is the key to providing a plant assessment with a focus on solutions. Put our operational expertise to work for you.

We can create a plant assessment to meet your specific needs

Basic assessment

- Engineering studies of your individual plant can be conducted to review the current process and performance vs. Air Products' operating standards for a similar facility. The assessment will help determine your plant's design limitations and focus areas to further investigate if necessary.

Detailed assessment

- Engineering study to determine design and operational limitations and focus areas for further investigation.
- Review the potential integration between multiple hydrogen plants, off-gas streams, and steam systems to increase efficiencies, and/or optimize overall production.
- Evaluate major plant process units:
 - Compressors and fans
 - Feed purification systems
 - Reformer & Convection Section
 - Process Gas Boiler/High Temperature Shift/PSA
 - Syngas cooling exchanger train
 - Instrumentation and controls
 - Boiler Feed Water & Steam system

Safety & Reliability assessment

- Inspection and evaluation of process conditions and operating procedures to address safe and reliable plant performance.
- Review current plant layout for safety improvements (ladders, platforms, concrete, etc.).
- Identify safety hazards.
- Review maintenance activities and programs.
- Review equipment protection systems.
- Inspect material conditions of the plant and equipment.



Here's what a hydrogen plant assessment accomplished for two of our customers:

Success story 1

Air Products was contacted by a US Midwest refinery that was experiencing operating issues with its Steam Methane Reformer (SMR) hydrogen plant and wanted to increase throughput and improve energy efficiency. Through a detailed plant assessment, operational changes performed on-site, and a performance test, Air Products helped the customer increase hydrogen capacity by 20% and improved the net hydrogen plant efficiency by more than 10%. Air Products also determined that a major flow indicator was reading erroneous values and immediately fixed the problem.

Success story 2

For older hydrogen facilities, it is increasingly difficult to meet tightening emission limits. Air Products, by exploiting features and particular conditions of the existing equipment, was able to demonstrate a cost effective solution to reduce NOx emissions by 50% to meet new permit requirements. In one case, an efficiency boost of 12.7 btu/scf was achieved resulting in \$110,000/year savings for that facility. In all cases, capital cost was minimal.

Training programs can be customized to meet your plant's individual needs. With a fast return on investment, can you afford to wait? The plant assessment is the first step to unlocking your plant's potential.

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