

ENABLING HIGHER-HYDROGEN BLENDING IN NATURAL GAS DISTRIBUTION SYSTEMS

Global Technology and Market Scan Summary Report for Distributing Hydrogen at >5% into
Natural Gas Energy Distribution Systems

REPORT SUMMARY

This report indicates there is a justifiable and feasible technical pathway for the blending of hydrogen in the natural gas delivery infrastructure. Hydrogen can serve as a means of reducing the carbon intensity of natural gas by reducing carbon dioxide (CO₂) emissions from end-use appliances. As more information on global best practices is gathered, it is becoming clear that a stepwise approach to gradually increasing the hydrogen composition in natural gas should be considered. However, significant work remains to be done to integrate hydrogen, and the next-generation RNG supplies that co-produce hydrogen, into the natural gas transmission and distribution systems and in end-use appliances.

KEY HIGHLIGHTS AND CONCLUSIONS FROM THE REPORT:

No Increase in Leaks

Overall, a natural gas distribution system that is 'leak tight' will remain 'leak tight' with hydrogen.

Additionally, 'selective leaking' of only hydrogen from hydrogen blended systems is not a phenomenon found within natural gas distribution systems.

Safe For Use in PE Systems

The permeability of hydrogen, through plastic (PE) pipe, is still being assessed for improved understanding, but this global scan could not identify any operating, safety or any conclusive and meaningful economic/life-cycle concerns with high-hydrogen blends in plastic distribution pipelines.

Compatible with Mercaptan

Technically, there are no known chemical

incompatibility issues of note between hydrogen and the odourising compounds commonly used in natural gas. Hydrogen should therefore have no deleterious interaction with odourants.

Studies have also indicated that commonly used odourants remain effective in hydrogen blended and pure hydrogen leak scenarios.

Metering Support

The consensus from the aggregation of various studies and projects is that the industry's metering technologies can support up to 10% hydrogen blends, and confidence is building for measuring 20% blends with existing technology.

Compatible with End-Use Equipment

End-use equipment and appliance manufacturers can also aspire to seamless operation on fuels ranging from 0% to 20% hydrogen by

volume with little or no incremental cost to manufacturing. Certification costs for Hydrogen-Ready appliances have some cost-impact today, but these certification costs are insignificant in a market where manufacturers understand that the lack of certification may preclude them from future unit sales.

Gas Turbine Ready

Major gas turbine manufacturers such as GE, Siemens, Solar, etc. are committed to not only having new electricity powerplant turbines 100% hydrogen compatible, but their objective is to provide a technical pathway for the existing legacy turbine fleets to also be upgraded to this capability.

Significantly, emerging from this global scan is the identification of a need for national, North American and global cooperation and sharing of best practices for hydrogen blending. The

report summarizes the results of several diligence reviews that highlight the global work that has been completed, barriers encountered & dealt with, regulatory experiences, lessons learned, materials & component information, as well as the opportunity for improved or harmonized standards development.

Several utilities have also suggested that opportunities exist for knowledge transfer, the development of best practices, and in-depth assessment of markets like Hawaii and Hong Kong, where hydrogen concentrations of approximately 10%, and higher, are the norm. While these markets may not have extensive gas transmission networks, their real-life operating and safety standards likely have a high degree of relevance to the distribution system materials, operations, and the performance of modern end-use appliances.

If trends continue, the historical, relatively homogeneous composition of natural gas will have increasing variability with increased RNG and hydrogen injections. The industry therefore is readying itself and signaling to stakeholders that greater flexibility in the typical composition of gas flowing through our pipelines is required.



KEY RECOMMENDATIONS AND ACTIONS:

