

Sustainable Blue Ammonia – A Tale of Competing Pathways to Low Carbon Fuel

Presenters

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Abstract

With its high energy density and versatility across industrial applications, blue hydrogen and its derivatives, such as ammonia, are becoming pivotal solutions in the low-carbon energy transition. The industry's approach to producing sustainable hydrogen focuses on using conventional methods, such as Steam Methane Reforming (SMR), while integrating carbon capture and storage (CCS) to reduce emissions. Natural gas and other hydrocarbon feedstocks remain the most economically viable sources for large-scale hydrogen production.

This presentation explores recent advancements in large-scale ammonia production from natural gas and the technological pathways shaping the energy transition landscape. It provides a comparative analysis of conventional and emerging production methods, including:

- Traditional SMR with post-combustion carbon capture
- Hydrogen-fired SMR with pre-combustion carbon capture
- Autothermal Reforming (ATR) with two distinct carbon capture layouts

The analysis will focus on key performance metrics, including energy consumption, emissions, process flow, layout efficiency and overall technological capabilities.

In addition, the presentation introduces a proven method for large-scale blue ammonia production, offering practical insights into the implementation of low-carbon technologies. By benchmarking conventional SMR- and ATR-based approaches, the comparative analysis will highlight the trade-offs and benefits of each route, helping stakeholders identify the most effective and economically feasible pathways for scaling blue ammonia production while meeting climate and energy targets.