



Hydrogen: A Cornerstone of Asia's Energy Transition

Hydrogen's Way Forward

As sustainability grows as an economic and social imperative, hydrogen is emerging as an attractive fuel for distributed and baseload power generation, as well as transportation, heating and green chemical production. But the questions that dominate the electric industry and energy companies throughout Asia are “When is the right time to invest?” and “How do we get started?”.

According to the Hydrogen Council, hydrogen could meet 18 percent of the world's energy demand by 2050. As a clean-burning, emissions-free and energy-dense gas, hydrogen offers a clear pathway to cost-competitive decarbonization where reliability, resilience and performance cannot be compromised.

Innovation Takes Hydrogen From Potential To Possible

According to a landmark report by the International Energy Agency (IEA) published in June 2019, hydrogen is experiencing unprecedented momentum around the world

due to its potential to tackle various critical energy challenges, offering a way to decarbonize a range of sectors and result in meaningful emission reductions. Across China, India, Korea, Japan, Malaysia, Singapore and Vietnam a mixture of government strategies and plans, inter-country initiatives and private sector pilots are gathering speed.

While the development of fuel-cell vehicles continues, the electric industry in Asia *today* has an opportunity to begin planning, studying and adjusting ahead of the introduction of hydrogen as a fuel source and as a vital component of the region's energy transition.

More than 60 percent of the region's electric industry leaders believe hydrogen will probably or definitely take off as a clean and affordable alternative to existing gas generation, according to Black & Veatch's *Strategic Directions: Electric Industry Asia 2021* report. Even at this nascent stage of development of the hydrogen economy, almost one in four, 24.1 percent are certain of hydrogen's future role.

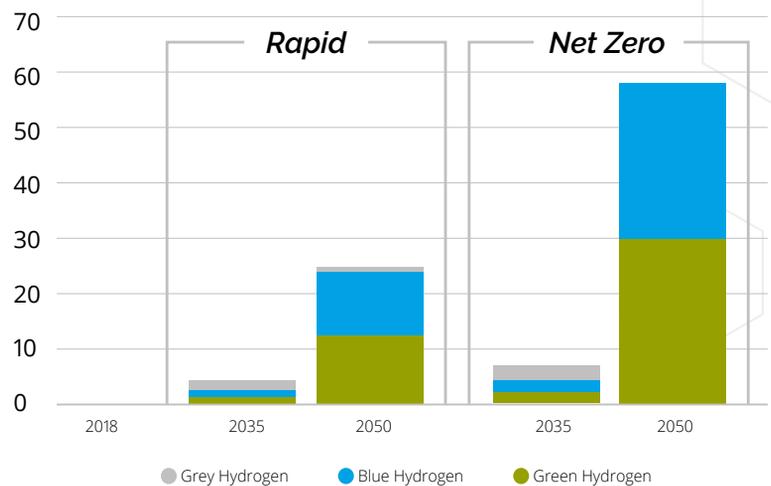
Generation Type that will Help Meet Clean Energy Goals

by 2030
Hydrogen
13.9% of survey respondents

beyond 2030
Hydrogen
57.8% of survey respondents

Source: 2020 Black & Veatch Strategic Directions Electric Report

Hydrogen production forecast by type



Source: BP plc

Hydrogen's Role In Reliable Power Generation

One of the most exciting and near-term opportunities for the industry concerns how hydrogen can be blended as a component of the fuel mix in gas-powered turbines. Such an approach could be applied to much of Asia's gas-fired facilities, where approximately one-third of the more than 90 gigawatts are less than ten years old: combining recent turbine technology and expectations of prolonged operating lifespans.

Current natural gas turbine technology can support hydrogen as part of their fuel mix at levels approaching 50 percent. In the United States, Black & Veatch is working with a number of clients investigating hydrogen's feasibility at existing gas plants as well as actively supporting the development of hydrogen-capable generation. In Singapore, a hydrogen-powered 'tri-generation plant' providing heat, power and cooling for a data center is being explored by Keppel and Mitsubishi Heavy Industries, and the Vietnamese government has recently flagged hydrogen use for electricity generation at independent power stations.

In the U.S., two hydrogen-capable projects – the [Long Ridge Energy Terminal](#), a 485-MW combined-cycle natural gas project in Ohio; and the [Intermountain Power Project \(IPP\) Renewal Project](#), an 840-MW combined-cycle gas facility in Utah – began developing hydrogen-capable generation facilities in 2020.

The IPA project will be commercially guaranteed of supporting a blend of 30-percent green hydrogen (hydrogen produced via the electrolysis of water) at start-up, with plans to transition to pure hydrogen by 2045. Long Ridge will begin operation with a 5-percent hydrogen blend in 2021 with plans to scale to full hydrogen fuel within a decade. This makes IPA and Long Ridge among the earliest large-scale users of combustion turbine technology designed to use a high percentage of green hydrogen.

By evaluating and future proofing gas-fired generation facilities, there is real potential for power providers in Asia to take advantage of near-term incentives that may emerge, contributing to significant reduction in carbon emissions as investments in coal assets decline and are eventually retired.



The Hydrogen Market by Color

Grey

Steam reforming
of natural gas into
hydrogen and CO₂

Direct atmospheric
CO₂ emissions

Blue

Steam reforming
of natural gas into
hydrogen and CO₂

CO₂ Captured, stored
and/or reused

Green

Renewable energy
powered electrolysis
of water to create
hydrogen and O₂

Zero emissions

Hydrogen As a Stabilizer of Future Renewable-Dominant Grids

Another significant consideration for Asia's power providers to start early in journey to hydrogen capable generation is to realize and plan for hydrogen's role in future grid stabilization and management. Lessons from California's blackout in 2020 – a U.S. state with significant renewable generation and good example of what future grids will look like – point to the importance of storage and alternative low-carbon baseload electricity for resilient grid operations. What was missing during this blackout was sufficient, flexible supplies of electricity that could be brought online quickly to meet sudden surges in demand. Similar system stability concerns have also emerged after the rolling blackouts in Texas in February 2021.

It is believed that hydrogen-based systems could emerge as a complementary solution to renewables and some natural gas-fired assets. Different reliability pricing services could be developed for industrial customers such as always-on data center providers, or semiconductor or pharmaceutical manufacturers where downtime can have serious impacts on business operations. Such sectors are not only seeking to expand across Asia but are also committed to zero-carbon emissions for their business and supply chains.



Next Steps for Owners of Natural Gas Plants In Asia

As governments and large customers continue to commit to decarbonize future, solutions and feasible pathways to achieve these goals – affordably and reliably – will require the consideration and integration of hydrogen as an alternative and clean fuel. Reviewing and studying how to future proof gas-fired facilities – across options including hydrogen as well as other technologies such as battery energy storage systems – are required to prioritize capital investments as early as 2022.

To Learn More

Download our global report: [Hydrogen 2021: The Path to Net Zero Becomes Clearer.](#)

Visit [bv.com/hydrogen](https://www.bv.com/hydrogen) to discover how Black & Veatch is helping to make hydrogen's potential a reality around the world.