

BRG ENERGY BRIEF

The Impact of Hydrogen Technology on Long-Term Natural Gas Supply Contracts

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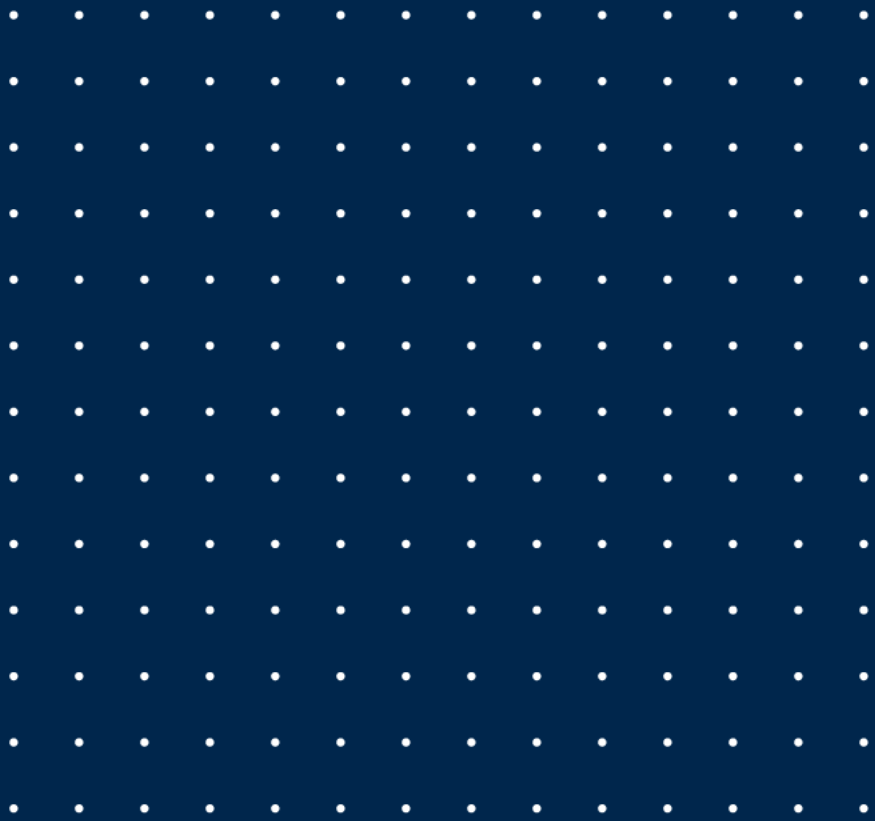
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INTELLIGENCE THAT WORKS



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This BRG *Energy Brief* looks at the potential impact of the likely growth in the use of hydrogen gas as a fuel and how this may impact both pipeline and LNG long-term gas contracts.

The world seems to be coming to grips with the idea that we are all passengers on “spaceship earth”¹ and that we need to act together to help reduce greenhouse gas (GHG) emissions into our atmosphere. This has led to an ever-increasing move towards “green” power generation technologies, commonly in the form of wind and solar power. As these technologies have matured, the intermittency of green electricity supply has materialised as a growing problem: electricity arrives when the wind blows and/or the sun shines, and there’s either too much or too little supply. In the search for a flexible supply, therefore, large-scale hydrogen production is increasingly being promoted.

The methods used to produce hydrogen are classified as “green”, blue”, “grey” and occasionally “turquoise”. Whilst the precise definitions vary, they generally entail something along the following lines:

“Green” hydrogen: produced by electrolysis of water with electricity produced solely from non-carbon-emitting sources such as wind or solar (though it’s not clear whether this is actually carbon neutral if those energy sources otherwise could be available to displace fossil fuels elsewhere).

“Blue” hydrogen: produced from hydrocarbons, usually by steam reformation, without CO₂ emissions. In essence, any carbon from the process is captured, for example to make into plastics, and/or captured with a carbon capture and storage (CCS) solution, such as injecting the CO₂ underground back into the field from which the hydrocarbon was produced.

“Grey” hydrogen: as with blue hydrogen, without CCS etc, or green hydrogen using electricity from CO₂-emitting power stations. For this reason, grey hydrogen does not reduce GHG emissions.

Some commentators also distinguish “turquoise” hydrogen as a variant of blue hydrogen, where the hydrocarbon is separated cleanly into hydrogen gas and carbon black (solid carbon) by pyrolysis. The solid carbon can be stored relatively easily and used by industry as a raw material, and this method has the advantage that there is no CO₂ that needs to be dealt with.

¹ As Kenneth E. Boulding pointed out in March 1966 in his essay “The Economics of the Coming Spaceship Earth”. He noted in particular that “The closed economy of the future might similarly be called the ‘spaceship’ economy, in which the earth has become a single spaceship, without unlimited reservoirs of anything, either for extraction or for pollution...” In H. Jarrett (ed.), *Environmental Quality in a Growing Economy*, Baltimore, MD: Resources for the Future/Johns Hopkins University Press, pp. 3-14.

Using blue or turquoise hydrogen as a primary fuel will mitigate the issue of 'hydrocarbon redundancy', particularly if the hydrogen can be manufactured using near zero-carbon technology and can be transported and stored using existing infrastructure. It is both logical and pragmatic that this is being considered as part of a future energy policy. Indeed a growing hydrogen economy already exists, and new hydrogen strategies, policies and projects seem to be announced with ever-increasing frequency and investment commitments.

Widespread use of hydrogen is not without its own challenges. The energy density of hydrogen is lower than that of natural gas, and further research is needed to assess the integrity of existing gas systems when used to transport and store hydrogen. Notwithstanding these issues, the substantial international commitments to hydrogen projects (including those listed below) should ensure that hydrogen technology receives adequate funding to assess its abundant potential.

There has been a marked increase in interest in hydrogen recently. Whilst this is far from a statistically significant survey, last month (December 2020) saw numerous investment and policy commitments relating to hydrogen. One of the most significant was the EU endorsing "a binding EU target of net domestic reduction of at least 55% in greenhouse gas emissions by 2030 compared to 1990".² A legally binding commitment of this magnitude is likely to give a significant impetus and urgency to the adoption of hydrogen technology throughout the EU.

Other announcements in December 2020 include "a new £100 million Low Carbon Hydrogen Production Fund" by the UK Government,³ the California Energy Commission approving "US\$115 million to significantly increase the number of fueling stations in the state that support hydrogen fuel cell electric vehicles",⁴ the US Department of Energy's Office of Fossil Energy announcing federal funding for cost-shared research and development projects "to develop hydrogen-fuelled turbines",⁵ the Canadian government launching its "strategy to become global hydrogen leader... underpinned by a federal investment of CAD1.5 billion (USD1.2 billion)",⁶ and Italy's Snam announcing that "70% of pipeline system now hydrogen-ready",⁷ amongst many other things.

It already looks like trend is continuing in 2021, with the first week of January seeing announcements that Russia is looking "... to become leader in Hydrogen tech", with Russia's deputy Prime Minister noting that "hydrogen may constitute 7 to 25 percent of the global energy balance by 2050"⁸; and Airbus announcing studies to "determine how scalable a hydrogen fuel cell "pod" configuration ... could be to large commercial aircraft".⁹ In India, January 21 was the closing date to submit bids to develop the "Hydrogen Fuel Cell-Based Hybrid Train Between Kalka and Shimla",¹⁰ and in the UK, Scotland announced aims "to demonstrate first hydrogen powered train later this year".¹¹

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2 European Council, "European Council meeting (10 and 11 December 2020) – Conclusions", General Secretariat of the Council (11 December 2020), available at: <https://www.consilium.europa.eu/media/47296/1011-12-20-euco-conclusions-en.pdf>

3 UK Parliament, "UK Hydrogen Economy", House of Commons Library debate pack (16 December 2020), available at: <https://commonslibrary.parliament.uk/research-briefings/cdp-2020-0172/>

4 World-Energy Media, "California Commission Approves Plan to Invest Up to US\$115 Million for Hydrogen Fueling Infrastructure" (15 December 2020), available at: <https://www.world-energy.org/article/14567.html>

5 Green Car Congress, "DOE to invest \$6.4M to develop hydrogen-fueled turbines" (4 January 2021), available at: <https://www.greencarcongress.com/2021/01/20210104-doe-turbines.html>

6 World Nuclear News, "Canada launches strategy to become global hydrogen leader" (18 December 2020), available at: <https://www.world-nuclear-news.org/Articles/Canada-launches-strategy-to-become-global-hydrogen>

7 Matalucci, Sergio, "Italy's Snam says 70% of pipeline system now hydrogen-ready", *PV Magazine* (18 December 2020), available at: <https://www.pv-magazine.com/2020/12/18/italys-snam-says-70-of-pipeline-system-now-hydrogen-ready/>

8 World Energy-Media, "Russia Looks To Become Leader In Hydrogen Tech" (3 January 2021), available at: <https://www.world-energy.org/article/14978.html>

9 Green Car Congress, "Airbus exploring hydrogen fuel cell propeller 'pods' for aircraft propulsion" (3 January 2021), available at: <https://www.greencarcongress.com/2021/01/20210103-airbus.html>

10 Ranjan, Rakesh, "Bids Invited for Hydrogen Fuel Cell-Based Hybrid Train Between Kalka and Shimla", *Mercom India* (5 January 2021), available at: <https://mercomindia.com/bids-invited-hydrogen-fuel-cell/>

11 Intelligent Transport, "Scotland to demonstrate first hydrogen powered train later this year" (5 January 2021), available at: <https://www.intelligenttransport.com/transport-news/113339/scotland-hydrogen-train/>

The combination of new legislation, stronger environmental policy and substantial financial commitments suggests that hydrogen will become a significant part of the global fuel mix and a potentially significant competitor to natural gas in due course. This, in turn, has implications for long-term gas contracts. As hydrogen markets develop in the EU and elsewhere, potential areas of impact on European natural gas and LNG contracts include:

- determining whether and when market change is sufficient to meet the trigger criteria for a contractual price review or price renegotiation, leading ultimately to adjustments to prices and price formulae in contracts.
- where contract prices are determined using a tariff basket-type approach, a need to revise tariff baskets to include hydrogen—not a simple task, given the lack of benchmarks in many markets.
- under the terms of the existing long-term import-export contracts, it may also be necessary to adjust contract prices and pricing mechanisms to ensure that natural gas remains competitive in the face of the financial incentives, subsidies and taxes need to meet the carbon reduction targets.
- to the extent that gas transmission network operators start to require natural gas and hydrogen to be blended for transport (e.g. a pipeline carrying 20 percent hydrogen and 80 percent natural gas), there are implications for technical specifications of gas set out in the existing contracts (not usually an area that is impacted by changes in fuel mix).
- to the extent that EU or national regulations require a certain percentage of hydrogen to be blended as part of a market transition strategy, this can have implications for force majeure and shipping clauses (e.g. what happens if LNG or natural gas isn't allowed to be imported because the supply of blending hydrogen has failed?).

The widespread adoption of hydrogen will, therefore, impact buyers, sellers, transporters and traders of natural gas over the coming months and years, and they will need to seek legal advice (and potentially economic expert advice) across a range of interrelated contractual and market issues.

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Christopher Goncalves and Anthony Melling are coauthors of the chapter on "Expert Evidence in Price Reviews and Disputes" in Gas and LNG Price Arbitrations 2019 (ISBN: 978-1-787421-92-9).

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