

Fifty shades of hydrogen

How to address 'clean fuel' hydrogen in fossil divestment policies

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Hydrogen is seen as key in supporting the transition to a low carbon or net-zero emissions future. It does not release CO₂ when burned, which makes it a climate-friendly alternative fuel to coal and gas. But is it really a clean fuel?

To accurately assess hydrogen's contribution to global warming, we need to look at its total lifecycle emissions – that is, all stages of its production and use.

Although hydrogen burns cleanly, with no harmful emissions, it is primarily manufactured from fossil-fuel feedstocks. **Production methods differ, but in "fossil fuel" terms, the production process is crucial.** Examples of fossil-fuel feedstocks used to manufacture hydrogen include crude oil, natural gas and coal.

Production methods are denoted by colours. Grey hydrogen, which is the most common form, is made from natural gas, which makes it a fossil fuel.

Green hydrogen, on the other hand, uses renewable sources of electricity, such as wind and solar, to power the electrolysis of water, which splits water into hydrogen and oxygen. Hydrogen production methods include:

- Grey hydrogen, which uses a process called steam reforming and produces nine tonnes of CO₂ per tonne of hydrogen produced.
- Green hydrogen, which uses renewable energy to extract hydrogen from water.
- Black hydrogen, which is manufactured from bituminous coal.

- Brown hydrogen, which is made from lignite.
- Blue hydrogen, which is essentially grey hydrogen where most but not all the CO₂ has been captured. Despite this, estimates suggest its full lifecycle emissions are at least as high as natural gas.
- Turquoise hydrogen, which uses a process called methane pyrolysis to produce hydrogen from natural gas. This approach is described as emissions-free because the carbon removed is generated in solid form. However, industrial use of the resulting solid carbon could release CO₂ into the atmosphere.

Blue hydrogen raises questions over expanding carbon capture and storage capabilities. For effective climate management, storage must be robust on timescales exceeding 10,000 years. Blue hydrogen increases climate risk and poses moral hazard.

Hydrogen, particularly blue hydrogen, is being backed to lead the charge into the clean energy transition by the Hydrogen Council, which was established by the oil and gas industry. From that industry's perspective, switching from natural gas to blue hydrogen may be economically beneficial since more natural gas is needed to generate the same amount of heat.

Fossil divestment

For portfolios, fossil divestment helps manage climate risk. It focuses on keeping carbon beneath the ground or targeting emissions from the burning of fossil fuels. With the current emphasis on net-zero targets, an emissions focus may seem more appropriate. However, with water vapour

the only product from burning hydrogen, divestment policies formulated around carbon emissions may find addressing hydrogen challenging.

Keeping carbon reserves beneath the ground is key. In 2012, estimates suggested that, to keep global warming below 2°C above pre-industrial levels by 2050, no more than 565 gigatons of carbon dioxide could be pumped into the atmosphere.

At that time, proven underground coal, oil and gas reserves amounted to 2,795 gigatons – far more than the climate could tolerate for below 2°C warming if they were extracted and used.

The 2015 Paris Agreement’s goal is to limit global warming to ‘well below’ 2°C, preferably 1.5°C, above pre-industrial levels. And in 2018, a report by the Intergovernmental Panel on Climate Change (IPCC) made clear the dangers of continued global warming, even at 1.5°C.

Another IPCC report, in 2021, suggested that, for a 67% chance of keeping warming at 1.5°C, no more than 400 gigatons of carbon dioxide can be emitted.

An investment policy defined around non-extraction offers clarity on the position fossil fuel divestors should take regarding hydrogen as a fuel.

The manufacture of black, brown, grey, blue and turquoise hydrogen relies on the extraction of natural carbon reserves. As a result, they are all highly refined fossil fuel gases, and so breach a divestment policy of non-extraction of natural carbon reserves.

Net-zero targets emphasise that removals must balance human greenhouse gas emissions to achieve climate stability. There is already too much carbon, in the form of carbon dioxide, in the atmosphere, so natural reserves of carbon need to remain underground, unexploited.

Climate risks

Plans to continue fossil fuel use present significant climate risk and moral hazard. It might not be possible to deploy the technologies needed to address emissions from fossil fuels at the necessary scale. It is safer, then, to reduce emissions.

Moral hazard arises when schemes offer the lure of not needing to change behaviours, resulting in delays to the rapid emissions reductions necessary. For example, blue hydrogen could lock the economy into using fossil fuels instead of reducing emissions.

Some fossil-divested fund managers appreciate these arguments. They have already concluded that black, brown, grey,



Hydrogen is only emissions-free when burned. Over its lifecycle, including manufacture, most hydrogen has CO₂ emissions

blue and turquoise hydrogen are related to fossil fuels and should be excluded by fossil divestment. For others, the position appears less clear.

How do investments into firms developing hydrogen-based applications fit into divestment policy?

Green hydrogen needs development and requires appropriate technologies for use. A fossil divestment policy based on non-extraction of natural carbon reserves focuses on methods of hydrogen manufacture, not its use. Sustainable investors can still hold firms developing hydrogen technology or better electrolysers. The electricity source matters, but strictly that is a separate question.

What about firms with a partial involvement in grey hydrogen but

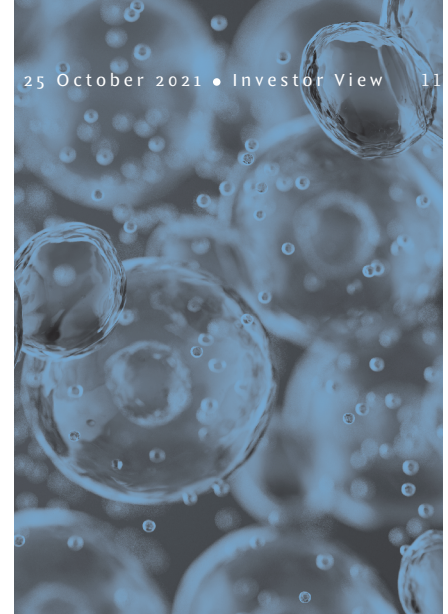
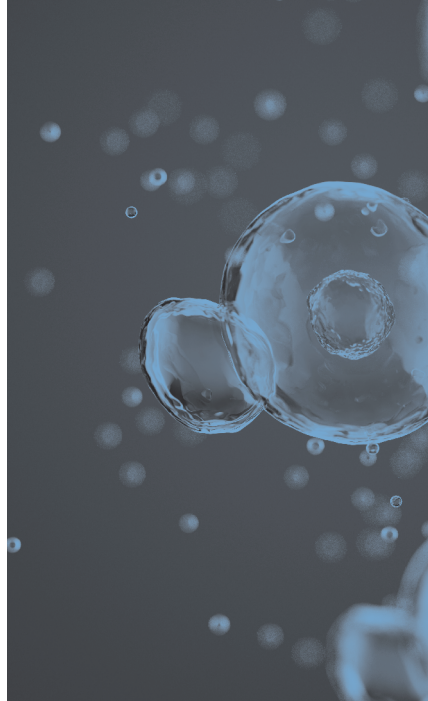
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developing green hydrogen? Is grey hydrogen manufacture not banned under the non-extraction fossil divestment policy? Yes it is, but a 'de minimis' policy can address it.

Suppose a firm's sales or turnover from 'fossil hydrogen' manufacture is less than the stated de minimis (say 10%). The investment would not be prohibited, since the involvement is considered minimal. Fund managers could also engage with the firm to progressively reduce its fossil hydrogen involvement.

Fund managers might struggle to access data on the hydrogen manufacturing activities of potential investments. The information available from some ESG data providers may be insufficient to identify the different forms of hydrogen production.



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But fund managers should engage with their ESG data providers to ensure they have the information required to implement a robust fossil divestment policy, or conduct research themselves.

The definition of fossil divestment policies also arises for sustainable index tracker funds. Some of these are fossil divested, but the index methodology may not address fossil hydrogen. If so, tracker funds based on it are unlikely to be free of fossil hydrogen. If index providers have no interest in updating policies to address fossil hydrogen, this would be a concern.

Sparkling clean hydrogen

Hydrogen is only emissions-free when it is burned. Most hydrogen emits CO₂ at some point over its lifecycle and increases climate risk or moral hazard.

Emerging interest in hydrogen as a clean fuel represents a significant environmental challenge. However, a clear, robust investment policy response by committed ethical and sustainable fund managers also offers an opportunity for meaningful leadership.

Fund managers' fossil divestment policies should emphasise the non-extraction of carbon reserves. Prohibiting investment in black, brown, grey, blue and turquoise fossil hydrogen production will help protect the climate.

Vested interests are promoting hydrogen as a clean fuel, which is not always the case. Fund managers need to robustly define their fossil divestment policies to make clear they prohibit fossil hydrogen. Clients will appreciate the clarity and demonstrable leadership on climate-friendly investment. ●