

[Edit article](#)[View post](#)

Five thoughts about Hydrogen

**Nicolas PAYEN**Passionate about Climate Change Mitigation |
Experiences within Energy, Transportation, Building

March 16, 2021

A. "100% Green Hydrogen" commitment is mandatory for the hydrogen players to position this technology as a credible climate change mitigation solution. Yet none of them make public such a commitment.

In the next points, I will explain why only GREEN HYDROGEN makes sense from a climate action point of view. Unfortunately, the O&G players lobbying for the hydrogen infrastructures do not take a firm position on the 100% Green Hydrogen. It shows their possible interest in using this as a Trojan horse to find new distribution channels for their existing carbon-intensive products and/or gain policymakers' support.

I wish to see all Hydrogen players and O&G leaders like BP, E.ON, Enel, Engie, Exelon Corp, Iberdrola, KEP, Tepco, Total, or Shell create a "100% GREEN HYDROGEN" movement by committing to only producing, distributing, and selling hydrogen from renewable energy sources as part of their climate pledge.

B. Grey or Blue Hydrogen can be worse than Coal for Climate.

Here are some figures that explain the impact of different electricity generation technologies on the climate (source [here](#))

- electricity from coal: 870 g-CO2 eq per kWh
- electricity from gas: 464 g-CO2 eq per kWh
- electricity from solar: 41g-CO2 eq per kWh
- electricity from wind: 14g-CO2 eq per kWh

Producing Hydrogen required energy, and then, most of the time, you need to produce electricity from hydrogen to use the energy. The overall efficiency of these processes is low (max [50%](#) today).

That means you need twice as much energy to produce electricity from hydrogen from gas compare to producing electricity from gas directly.

It also means the carbon intensity of Hydrogen is double the carbon intensity of its primary energy. Let's make some simple estimations.

- Electricity from Hydrogen from coal: **1740 g-CO2 eq per kWh**. This is called black hydrogen.
- Electricity from Hydrogen from gas: **928 g-CO2 eq per kWh**. This is called grey or blue hydrogen.
- Electricity from Hydrogen from solar: 82 g-CO2 eq per kWh. This is called Green Hydrogen.
- Electricity from Hydrogen from wind: 28 g-CO2 eq per kWh. This is called Green Hydrogen.

These numbers show that Green Hydrogen is a climate friendlier solution than existing fuel. But it also demonstrates that Black, Grey, or Blue hydrogen are absolutely not climate-friendly. **They are today worse than fossil fuel energies and would put the world on an even more dangerous path.**

Even if the processes associated with the creation and conversion of energy into Hydrogen would reach 100% efficiency, none-green hydrogen would still be far away from representing a solution to the climate crisis, they would still in fact be part of the problem. Hydrogen carbon footprint can only be as good as the carbon footprint of the primary energy used to create it.

C. Green hydrogen should be part of the energy transition.

Green hydrogen has unique characteristics that make it attractive. It allows you to store energy for a long time, and you can also move energy where the transmission lines do not apply or where local production of renewable energy is impossible. For these reasons, there are some applications where Green Hydrogen has a unique advantage compare to other technologies. Green Hydrogen offers also a smoother transition as it allows to convert the existing O&G skills and workforces towards Climate-friendly activities. Producing, distributing, and trading Hydrogen is indeed in many ways similar to the current processes used in the O&G industry.

The main issue for Hydrogen is that an existing engine/machine/equipment/load that uses existing fuel or gas can not use hydrogen. It means you need to double your infrastructure to deliver hydrogen in parallel with the existing infrastructure while you are replacing all the loads. We still need to solve many problems to define and improve the business cases for Green Hydrogen infrastructures.

D. Shipping Hydrogen around the globe often makes little sense.

The simplest way to understand why is maybe to make a simple analogy.

Shipping hydrogen is like printing emails to put them in an envelope, sending these mails by post to the recipients' location, then scanning them for the recipient to read them on its internet device. It clearly makes little sense!

The carbon footprint of producing hydrogen from electricity, shipping hydrogen tanks, and converting hydrogen to electricity is far greater than sending electricity over a transmission line.

We are already today transmitting electricity over a very long distance. The longest transmission lines in the world are in Brazil, India, and China.

The longest one covers a distance of 2500 km.

E. Hydrogen players that do not commit to 100% Green Hydrogen shall not be financed or get governmental support. It is where the global financial system needs to put its money where its mouth is.

The global financial system is already highly exposed to climate risk. Many banks and asset managers have stranded assets that can not be refinanced or insured. Financing Hydrogen infrastructure without a guarantee of "100% green hydrogen usage" would just increase the risk of their portfolio. These new infrastructures shall be designed to become part of the climate solution and its backers shall ensure that it remains the greenest assets possible.

Lobbying for Hydrogen without taking a 100% Green Hydrogen commitment only aims to create confusion and delay climate policies that could either arm the O&G industry or support aggressively other viable climate technologies.

Only a clear statement of "100% Green Hydrogen" can help gather broader support for Hydrogen. Without such a statement, I and many will doubt the true ambition and motivations behind the development of Hydrogen and remain very concerned about its climate impact.

#hydrogen #energytransition #fuelcell #powergeneration
#renewableenergy #climateaction #climatefinance #greenwashing
#projectfinance #infrastructure #solar #wind #100%greenhydrogen
#100GH

Comments

  12 ·

7 comments



 Like

 Comment

 Share



Add a comment...



Most relevant ▾

Lusi K. · 3rd+

Tax Audit | Business Process Re-engineering | Information System D...

7mo ...

Very insightful Nicholas. Thank you. It made me wonder whether doubling the infrastructure to cater for green hydrogen meant building on the existing one or getting new engines etc.

Like | Reply · 1 Reply



Nicolas PAYEN Author

Passionate about Climate Change Mitigation | Experiences wit...

7mo ...

I would require the additionality of the Renewable Energy (RE) capacity used for green hydrogen. Prioritizing direct electrification is the most efficient in terms of Net Carbon Savings. Let me add an example:

- Let's say you have an existing on-shore wind farm that pro ...more

Like | Reply

More articles for you



Charting the Skies: The Start-up Journey as an Epic Flight

Nicolas PAYEN

🌐 2 · 1 repost



2023 was a great year for Climate Tech investors

Nicolas PAYEN

🌐 3 · 1 comment



Are behind-the-meter battery energy storage systems the secret enabler of our 2030 climate targets?

Nicolas PAYEN

🌐 4 · 1 comment