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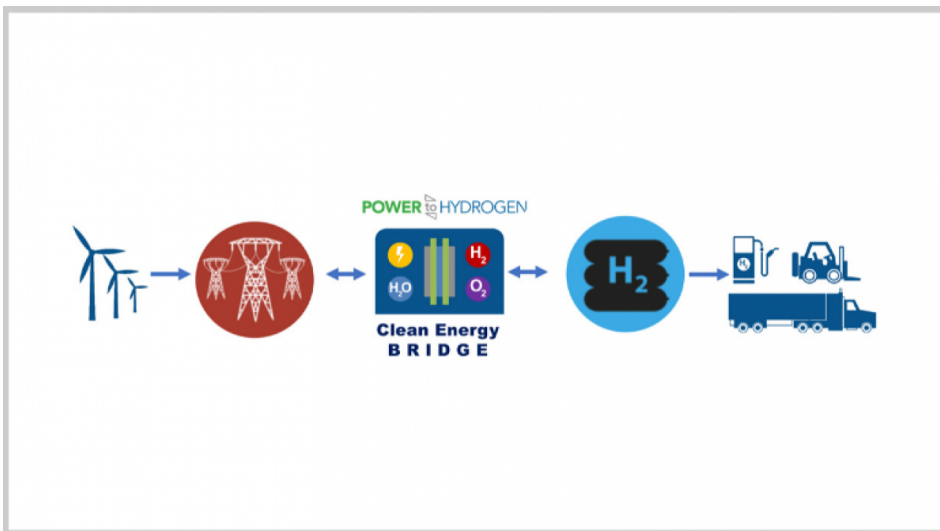
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## Hydrogen Now! – The case for accelerating an energy transition

04 Mar 2020

Contributed by: [Tad Dritz](#), Co-founder/CEO, Power to Hydrogen

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Abundant and clean, hydrogen (H<sub>2</sub>) is the fuel of the future. It can be produced from a variety of resources, including fully renewable pathways, and used with zero emissions. We have everything needed today to make the switch from fossil fuels. However, the transition needs a kickstart, and this is why I call for Hydrogen Now! Greatly improving availability and access to low-cost hydrogen will have a profound impact, leaving us with a healthier and wealthier planet.

Hydrogen is a forever fuel that comes in colours (kind of). We will never run out of the simplest and most abundant element in the universe. Here on earth, it is mainly found bound to oxygen (in water) and carbon (in hydrocarbons). Extracting hydrogen from water via electrolysis can be essentially carbon-free if powered with renewables, like ERM's Dolphyn Green Hydrogen plan to combine wind power with desalination and electrolysis on floating platforms in the North Sea. This low carbon variety is known as 'green', as opposed to 'grey' which is derived from non-renewable

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resources, typically natural gas. Although, Ekona Power believes green hydrogen can be had from natural gas by capturing carbon from steam methane reformers.

Hydrogen is converted to power in a fuel cell, a device that combines hydrogen with oxygen making electricity and water. Basically, electrolysis in reverse. Compared to the currently dominant internal combustion engines that power most vehicles today, fuel cells offer twice the efficiency and eliminate point source carbon dioxide (CO<sub>2</sub>) emissions as well as harmful particulates and smog-causing pollutants. Efficiency matters most when engines run more, so it is not surprising to see fuel cells being used in fleet vehicles. Examples include Plug Power's fuel cell lift trucks in Wal-mart and Amazon warehouses and Nikola's plan for hydrogen-powered heavy-duty trucks. It is also being used in marine craft, the original fleet vehicles, which can run longer, quieter and cleaner with hydrogen, including (reportedly) Bill Gates' newest yacht.

Every day hydrogen is safely made, stored, delivered, dispensed and used. California now boasts more than 40 active hydrogen filling stations with many more on the way. These service a growing base of Toyota Mirai's and other fuel cell cars that safely travel the roads alongside gasoline and electric vehicles. In Bristol, UK, the hydrogen-powered Hydrogenesis passenger ferry has been in service since July 2013. Although substantial, use in vehicles is small compared to industrial applications, such as oil refining and metal annealing, which happen daily without incident. Further, hydrogen is never spilt; if there is a leak, it disperses into the air. Admittedly, hydrogen-related incidents have occurred, as they have with every energy source (or carrier); however, just like cars, gas grills and other powered devices, those using hydrogen can be operated safely when properly handled.

With the pieces in place, the time is ripe for an energy revolution. But change takes an impetus and revolutions do not happen without a band of conspirators. Our growing climate crisis should be reason enough to make the switch to hydrogen, but it is only one in a long list of benefits that include healthier air to breathe, ending reliance on imported energy and an economic boom that could define a generation.

Famously, in 1923 Coca-Cola stated that their product should always be 'within an arm's reach of desire.' The same applies to hydrogen that must be made widely available to foster use. To make hydrogen and get it to the point of use will require substantial infrastructure. Fortunately, a good deal of our existing natural gas pipe network can be repurposed. However, hundreds of billions of dollars of new production, distribution and filling stations are needed to make the transition. And while the price tag may seem daunting, we would be investing in a sustainable future while generating a prodigious amount of economic activity. We will also benefit from reducing illness and fewer deaths by abating pollution and mitigating the increasingly costly impacts of global climate change.

As for conspirators, I am one and I invite you to join me. My company (Power to Hydrogen) is developing Clean Energy Bridge that combines electrolysis with a fuel cell so one unit can generate both hydrogen and power. This lowers capital cost and improves utilization, ultimately making hydrogen cheaper and accessible to more users. However, we need more collaborators and competitors, more financiers and projects, bigger thinkers and doers to make a thriving market for hydrogen as ubiquitous as the fossil fuels we aim to replace. It will take a concerted effort by suppliers, users, regulators, and investors to make the market for hydrogen and we need to start today.

We are living in an amazing time where we can capture sunshine and wind to turn water into fuel, then use that fuel to power our lives, leaving only water (and some waste heat). To make this dream come true, I say Hydrogen Now! Who's with me?



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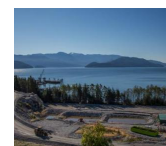
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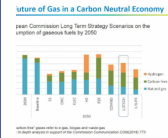
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