WORLD BUSINESS ACADEMY
Sharing the Vision... Building the Network... Healing the Planet

PERSPECTIVES

by ***Rinaldo S. Brutoco***

Rinaldo S. Brutoco is the Founding President and CEO of the Santa Barbara-based World Business Academy and co-founder of JUST Capital. He's a serial entrepreneur, executive, author, radio host, and futurist who's published on the role of business in relation to pressing moral, environmental, and social concerns for over 35 years.

Hydrogen – The Simple Solution

Unpacking the Color Codes for our Future Fuel

Brown Hydrogen, Grey Hydrogen, Blue Hydrogen, Green Hydrogen. Who knew hydrogen, the most abundant element in the universe (76 percent of all molecules in the universe are hydrogen), came in so many colors!

Actually, it doesn't. Those color references relate to how hydrogen ("H2") is made. If the source of electricity for electrolyzing H2 from water to make the H2 is coal, the resulting H2 is called "Brown Hydrogen." A nasty business—burning incredibly polluting coal to create H2 doesn't solve the climate crisis. Yet, there is a massive liquid hydrogen ("LH2") plant being built right now in Australia that will be supplying all the LH2 it makes from burning coal directly to Japan, via a Kawasaki built ship that has just been constructed to carry that LH2. The ship will carry LH2 from Australia to Japan for decades. Ouch! That's a whole lot of coal to be burned, further driving global warming. What are those Aussies thinking?

Then there is "Grey Hydrogen." When natural gas is "cracked" to create H2 through a process called "steam reformation," it is called Grey Hydrogen. This is how the vast amount of H2 is created today.

Next comes "Blue Hydrogen." That occurs when hydrogen is created by "steam reformation" as with Grey Hydrogen but with the additional step of sequestering much of the CO2 thereby created in some fashion. As you might imagine, this ridiculous approach does very little to halt, let alone reverse, climate change, because it creates so much CO2 in the process. Nonetheless, it is being pushed heavily by fossil fuel companies. They just don't want to stop using fossil fuel and will go to exaggerated lengths to try and convince people Blue Hydrogen makes sense. It doesn't. The public is wise to the oil company propaganda and will, in the long haul, not be willing to buy Blue Hydrogen. It will prove to be a commercial failure no matter how hard fossil fuel companies push it. Blue just doesn't address the fundamental problem: we are running out of time to drastically reduce greenhouse gases. Blue Hydrogen only pretends to reduce the increases of greenhouse gases—that won't save Western civilization. We need to reverse the damage we have already done, and not settle for doing incrementally less damage each day, which continues to cumulate more and more greenhouse gases in the atmosphere.

All of this leads us to the solution Wall Street, corporate America, and even Saudi Arabia have decided makes the most sense: Green Hydrogen. It's called "green" because the source of the electricity to electrolyze the hydrogen from water is 100 percent renewable. The main sources for that type of energy are solar, wind, geothermal, and ocean thermal energy conversion ("OTEC"). When all the energy to split hydrogen and oxygen apart comes from 100 percent fossil fuel free renewable energy you have a fuel, at last, that eliminates all greenhouse gases. When Green Hydrogen is consumed in a fuel cell to power a car, truck, bus, boat, or a dirigible like the H2 Clipper, it produces only one by-product: pure water.

To create Green Hydrogen, one needs to start with really inexpensive electricity, as 68 percent of the cost for making green hydrogen from normal water is the cost of the electricity. The Academy has done studies showing that a cost of 2¢/kilowatt hour or less puts you in one of the greatest business opportunities of the last two centuries. It allows you to make Green Hydrogen which will drive a car, for example, at the equivalent of approximately $3.00/gallon. You read that correctly, Green Hydrogen is 100 percent safe for the planet, replaces fossil fuel greenhouse gas emissions, and does so at a cost that is about the cost of a gallon of gas. That's a revolution.

According to Presidential Climate Envoy John Kerry, the US energy industry should embrace "huge opportunities" from the production and transportation of

H2. He sees immediate and massive markets particularly in fueling vehicles (especially long-haul trucks) and as an alternative electric power source, provided it becomes "greener." He's right.

Mr. Kerry predicts, "By 2050, you're going to have about $6 trillion a year of economic transfer taking place in the clean energy technology sector." Furthermore, he said, "It's the market of the future."

Two new reports from the Energy Transitions Commission confirm Mr. Kerry's optimism by observing that zero carbon emission electricity and hydrogen, which today account for only 20 percent of energy use, could account for 75 percent by midcentury, and clean energy will be cheaper by then than dirty energy is today. Confirming this conclusion, Market Watch predicted the cost of producing hydrogen from electrolysis will continue to plummet in the next 10 years.

In this column last week, we discussed the construction of a Green Hydrogen plant in Neom, Saudi Arabia as the country's response to the certain diminution of future fossil fuel sales. That is the largest and most prominent oil-based economy in the world. They are placing their future in the hands of Green Hydrogen and want to be the world's largest supplier. They already have plenty of competition, and more is on the way. All the Gulf countries have the same solar resources as the Saudi's, and they will all be jumping on board.

Then there's the enormous wind energy to be tapped in Scotland and the Orkney Islands, just to name two places that could immediately begin producing Green Hydrogen. The same is true of the tremendous volcanic energy which exists on the Big Island of Hawaii and throughout the nation of Iceland. Morocco has plans for making LH2 from their solar resources and England would do well to utilize many of those thousands of new coastal windmills they are building to make LH2. Of course, places rich with hydropower like Quebec would also be natural energy sources for LH2.

Circling back to the US, the Biden Administration intends to build thousands of offshore windmills—nothing better for making Green Hydrogen! Yes, we could create more energy for making Green Hydrogen (for domestic consumption and export) than we currently make destroying our aquafers by all the fracking! It's so simple. Water is a simple molecule: hydrogen and oxygen (H2O). Hydrogen itself is the simplest molecule. A fuel cell is a simple device with no moving parts. Hydrogen can store as much energy as we want for those days "when the wind don't blow and the sun don't shine." It's all so simple. The Green Hydrogen Economy is arriving.

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