

# Putting the Hydrogen Horse Before the Political Cart

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Picture this: you're at a party and you overhear someone say, "*Did you know that, pound for pound, hydrogen has nearly three times more energy than gasoline? I can't wait for the day I can drive a hydrogen-powered car!*" Having just read a news article about hydrogen, you pipe in with, "*That may be sooner than later. I've heard there's a new squeaky-clean process for extracting hydrogen from coal.*" Suddenly the guy behind you shrieks, "*Coal? Get serious! Everyone knows it's easier to get hydrogen from water! The coal lobby has their hooks into Congress, that's all!*" Oops. You're pleasant little conversation just veered off into a political ditch.

But is this fellow right about the ease of extracting hydrogen from water, or is he just bristling his political hairs? You don't know for sure. The article you read didn't mention a word about electrolysis, and you're basically illiterate about the science of hydrogen energy. Don't worry; it's no crime to forget all of those out-of-context facts they tried to hammer into your overstuffed brain back in Chemistry-101. Most of us do. Nor should you be too dismayed if you can't readily explain how a fuel cell extracts energy from hydrogen, why it's so difficult to compress hydrogen into a small volume, or how wind and sunlight can be used to produce the airy stuff. For the most part, it's knowledge that's only found in prohibitively pricey books or scientific journals too technical for most non-scientists. On the other hand, articles appearing in the popular press are often misinformed, politically jaded, or too cursory to be of much use in illuminating the complexities of hydrogen energy.

But the steepness of the learning curve doesn't get us off the hook. Now, more than ever, we need to understand the naked truth of just how high a state of higgledy-piggledy we've civilized ourselves into, and what we need to do to get back on cordial terms with a really wonderful planet. Unfortunately, this goes a bit beyond buying a bicycle, setting up a few solar panels, joining your local recycling program and hissing at your neighbor's SUV every time he drives by. Though all commendable gestures (except maybe for the hissing part) that could help delay the onset of global disaster if adopted on a grand scale, we'll never really be able to breathe easy and look our fellow creatures in the eye until we, as a species, have ceased to indiscriminately use the atmosphere as a dumping ground for the carbon-based byproducts of fossil-fuel combustion.

As simple as that sounds, the solutions are mind-bogglingly complex. It's a little like the problem Mad Max faced in the movie, *Beyond Thunderdome*, where Auntie Entity strikes a deal with Max to break up the Master/Blaster duo that provides the swine-generated energy for Bartertown. It gets to be a messy affair, somewhat analogous to the process of separating hydrogen and carbon. You can think of hydrogen as Master and carbon as Blaster. Hydrogen is everywhere, but whenever it's part of a fuel (gasoline, methane, coal, diesel, etc.) it's piggybacked to carbon, something there is already far too much of in the air around us. This means the hydrogen we burn in the future must be either plucked from its carbon

matrix before combustion, derived from a non-fossil, carbon-neutral fuel, or extracted from water, which contains no carbon. Unfortunately, all of these methods have their costs. It takes energy to make energy, and a lot of it.

The current best guess for how we might logically proceed toward a hydrogen economy involves using coal and natural gas—in clean processes that sequester carbon—as short term hydrogen sources, while developing and implementing a renewable solar, wind and biomass infrastructure over the long haul. On the plus side, all the technologies needed to make this happen already exist, at least on a small scale. The overwhelming problem we face is in producing—and paying for—the sheer volume of fuel humanity consumes.

This is where politics slithers into the picture and people start getting hot under the collar. Don't get me wrong; I have no problem with political wrangling. For better or worse, it's part of the process. I'm only suggesting that political opinions will serve a greater purpose when they're buttressed by cold, hard facts.

And the facts are these: Hydrogen can come from practically anywhere; from water to pond scum, from coal to garbage, from natural gas to peanut shells and grass. It can be processed from any source of energy—sunlight, wind, gasification of coal or biomass, nuclear or hydroelectric power—and it can be stored as a liquid, a gas, a hydride, or within the chemical matrix of an alcohol. And when it comes time to use it, hydrogen can be cleanly burned in either a fuel cell or an internal combustion engine. The point is, there is no *one right way* to wean ourselves from the beastly carbon cow and make the conversion to clean hydrogen fuels. The process will inevitably lead down a number of paths and will require the combined efforts of a multitude of rational, intelligent researchers, engineers, administrators and, yes, even politicians. Politicians who are obliged to listen to us, whether or not we know what we're talking about. Wouldn't it be better if...?

No, I don't need to say it.

**AUTHOR BIO:** Rex A. Ewing is a writer who loves a challenge, especially when it comes wrapped up in numbers and science that beg to be explained. When people in the hydrogen industry and the book world asked him to write a book about hydrogen and fuel cells for the non-scientist, he couldn't resist the opportunity to take dry—some would say incomprehensible—science, and craft a page-turner that reads like a best seller. His latest book is one that can be enjoyed by all, high school age on up. Even scientists will appreciate his vivid visualizations that get to the heart of their science.

From his solar- and wind-powered studio in the Colorado Rockies, Ewing has also written *Power With Nature: Solar and Wind Energy Demystified*, a best-selling book for homeowners; and *Logs, Wind and Sun*, a handbook for aspiring log home owners who want to live off-grid. Before moving to the mountains to concentrate on his writing, Ewing spent several years as CEO of a well-respected equine nutrition firm, and in 1997 he wrote a best-selling book on horse nutrition: *Beyond the Hay Days: Refreshingly Simple Horse Nutrition*.