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Is Hydrogen Truly The Fuel Of The Future?

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The Santa Fe New Mexican

A gas developer once told me he was working on Wyoming's last major boom in drilling. Tens of thousands of wells were, and are, tapping into vast coal reserves to release the methane gas trapped within. So what comes next?

"Hydrogen," he said. "I'm afraid everybody's got hydrogen."

Indeed. In fact, everybody is made of hydrogen. It's everywhere - - in water, in wood, in coal, oil and gas. The problem, of course, is that you need to expend energy to extract it from the source (more, some say, than you get out of it in the end).

Hydrogen has long been hailed as the fuel that would revolutionize the way we live. Fuel cells in cars and homes would "burn" hydrogen in a chemical reaction that produces only electricity, water and heat. Endless energy. No more smog or acid rain.

But this scenario has come under increasing scrutiny lately, even as it picks up speed in political circles both here and in Washington, D.C.

The first point of contention is semantic: Hydrogen is not so much a "source" of energy, which could be drilled or mined, but a "carrier" of energy that owes its existence to another source. In other words, producing hydrogen is akin to charging a battery.

Robert Park, who authors a newsletter for the American Physical Society, recently lambasted the "hydrogen economy," pointing out that its promoters "still haven't found a hydrogen well." Park's self-described diatribe followed a recent Caltech study in the journal Science indicating that a hydrogen economy could damage the ozone layer faster than CFCs, a now-banned class of chemicals once used in refrigerants, Styrofoam and aerosols.

Caltech's study was based on some calculations of hydrogen

leakage from storage tanks. The gas apparently is difficult to contain, while extremely-cool liquid hydrogen must be vented to prevent too much pressure from building up.

Ken Stroh, a fuel-cell researcher at Los Alamos National Laboratory, said his group is concerned about Caltech's results, which were based on NASA launches. While NASA loses about 16 to 17 percent of its liquid hydrogen to venting (that's the steam you see coming off the shuttle), Stroh said there should be ways to get around that problem.

And even if there aren't, we don't have to worry about ozone depletion with hydrogen, Stroh says. "If the leak rate is going to be 15 percent, I don't think we're going to have a hydrogen economy."

Mark Sardella has been working on energy issues for some time in Santa Fe and recently formed a group called Local Energy. Earlier this month, he penned an article titled "The Hydrogen Hallucination" for Energy Central, an online trade publication, arguing that "hydrogen hasn't even the slightest chance of solving our energy problems."

Sardella comes down on the energy-in/energy-out problem. From his perspective, hydrogen will never be a source of energy, given the costs of manufacturing, transportation and storage. Furthermore, he says the nation is ignoring plenty of options that are here, now, notably increasing gas-mileage on vehicles and other easy gains in energy efficiency.

"My conclusion is that we are pinning our hopes on a dubious technology that we don't have and ignoring solutions that are readily available," Sardella says.

Stroh says people who are researching hydrogen and fuel cells are aware of the problems raised by critics, but he doesn't believe they are insurmountable. Although you have to expend some energy to make pure hydrogen, fuel-cell efficiency brings the energy equation back into the black.

He says problems will have to be addressed regarding the transportation and production of hydrogen as well as with the fuel-cell materials, which are too expensive and lack durability. This despite the fact that the first fuel cells were developed more than two decades ago and are powering a limited number of prototype vehicles on the road today.

And, of course, it all depends on how you look at it. Oil, gas and coal have provided relatively cheap energy so far, but we seldom add up the latent environmental costs. As global warming takes hold, priorities and economics could shift as well, further increasing energy costs and making more expensive technologies more viable.

Jeff Tollefson covers science and technology for The New Mexican.