

Hydrogen

HOT STUFF :: COOL SCIENCE

2nd edition

Discover the Future of Energy

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PIXYJACK PRESS LLC

preface



When I was asked to write a book about hydrogen energy, I naively assumed it would be an easy task. It was not because I thought hydrogen energy would be an unchallenging subject. To the contrary, from the very beginning I had at least *some* appreciation of its scope and complexities. No, I thought it would be easy for the simple reason that I imagine *anything* I haven't yet done will be easy. This is how I talk myself into things; it's a personality trait I share with Daffy Duck. Even the doom-and-gloom, worst-case-scenario trolls lurking deep within my psyche failed to burrow their way into consciousness as I was deliberating whether or not to take on the project. I should have known then and there, by the trolls' conspiratorial lethargy, that I might just be kidding myself. But somehow I didn't. Perhaps it was fate.

However it came about, I now confess that this is the hardest book I've ever written. Its difficulty arises not from the complexity of the subject's individual parts, but from the expansive nature of the whole animal. Writing about hydrogen energy is, in many ways, writing about the future history of the world in all of its intricacies, since most of the technologies explored—and I use that word in a literal sense—are designed to forever transform the way we interact with the planet we live on.

But it's also been the most fun book I've ever written, because *Hydrogen—Hot Stuff Cool Science* is, more than anything else, an adventure. It's an adventure into the science of hydrogen energy, certainly, but it's also an adventure in its own right. This was nothing I planned, really—more just something that happened along the way from the first page to the last, as I was taken under the wing of an eccentric wizard in a fanciful place called the Wasserstoff Farm. (I'd like to say more here, but I'm already in danger of exposing the plot.)

For readers with solid science backgrounds, the first few chapters may seem deceptively simple. They are included mainly for those of you whose most vivid memory of Chemistry class is the pustule-like mole on Professor Schlitchenbarker's forehead. Or for those who may need a little brushing up on the not-unimportant distinction between breaking atomic bonds, and breaking atoms. But you'll also learn how and why the atmosphere resembles a greenhouse, why we're fortunate it does, and how to avoid getting too much of a good thing. And to make sure we all know just how big of a problem we're facing, a visually thought-provoking analysis of how much energy the U.S. actually consumes every year polishes off the first section.

Then it's on to the meat of the story: hydrogen energy. Where hydrogen comes from, the myriad ways to liberate it, and what to do with it, once we have it. The proposals for making hydrogen are as pristine and spritely as sunlight and water, as airy as a Midwest breeze, as down-and-dirty as coal, or as darkly forbidding as radioactive decay.

Making hydrogen, of course, is just a third of the equation, for we then have to decide how best to store something so light that a 5-gallon bucket of the stuff—even chilled and compressed into liquid form—weighs no more than a goose-down pillow. Do we squeeze it into ever smaller volumes (hydrogen becomes downright recalcitrant above 10,000 psi), or hide it inside microscopic tubes of carbon? Or is 200-proof moonshine the ideal way to get hydrogen from here to there?

And finally, what's the best way to use hydrogen? Should we hold out for the promise of fuel cells, or burn it in modified V-8s?

Since it's not always possible to be at once colorful and attentive to detail, you will find a reference section of a technical nature following every chapter. More than a simple listing of sources, or endnotes (a referencing scheme for which I have always had a strong aversion), the *Technistoff* sections provide specific data and resources to buttress the chapters' broad-based lessons.

The concept of hydrogen energy is so intrinsically beautiful it would seem a crime to burden it with the yoke of political rhetoric. I will, therefore, leave that muddy task to those who wear higher boots than I do. I learned long ago my political talents were as stunted as my piano-playing abilities, so I refrain from practicing either. Watching old Arnold Schwarzenegger movies is about as close as I ever get to hydrogen politics.

And finally: aside from the excellent graph of projected costs of hydrogen production on page 277, you will not find endless tables and graphs projecting capital costs, returns on investment, or the possible future cost of x if, and only if, conditions a , b , c and d are simultaneously satisfied. I'm just a humble purveyor of scientific knowledge, not an economist. But I do know that if we want something bad enough, we'll find a way to pay for it. Always have, always will.

Besides, as I may have already said, this book is an *adventure*.

REX A. EWING

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preface to the 2nd edition



Writing a 2nd edition of *HYDROGEN—Hot Stuff Cool Science* was a lot like refinishing a favorite piece of furniture. Though the craftsman protested, desiring instead to create a new work from scratch, the artist admired the shiny new finish and the countless hours it took to apply it.

In a personal sense, however, it was more like spending a long working vacation with a dear old friend. I mean this literally, since the old friend in question has a name and persona as real to me as Santa Claus is to any dreamy-eyed four-year-old.

I am referring, of course, to my mentor, Zedediah Pickett, the enigmatic wizard who graces these pages with his wit and wisdom, and his sorcery on a Herculean scale. It had been over two years since I'd last visited Zed and the Wasserstoff Farm, and it was time to see what was new in the world of energy.

I wasn't disappointed. Fuel cell cars have come a long way since 2004 and limited production models are tantalizingly close to becoming reality. Great strides have been made in processing hydrogen-rich bio-fuels, while the list of possible feedstocks continues to grow. Studies on carbon sequestration are ready to start showing practical results. And a new breed of nuclear reactors just may provide the means to turn mountains of radioactive waste into electricity and hydrogen.

These are just a few of the high spots Zed so skillfully illuminates. The general trend in the energy sciences today is toward increased creativity in finding new energy solutions, and a more lively pursuit of their applications. Already the glittering gems of research destined to brighten the pages of the 3rd edition are beginning to surface.

But that's still a couple of clicks down the ol' space-time continuum. For now, I hope you find enough wonder in these pages to tide you over.

Rex A. Ewing
Halloween, 2006