

# Re: Low Cost Hydrogen is here to stay

---

*Source:* <http://sci.tech-archive.net/Archive/sci.energy.hydrogen/2007-12/msg00119.html>

---

- *From:* Monkey Clumps <[spacebrain71@xxxxxxxxxx](mailto:spacebrain71@xxxxxxxxxx)>
  - *Date:* Sat, 15 Dec 2007 07:56:21 -0800 (PST)
- 

Willie.Moo...@xxxxxxxxxx wrote:

On Dec 14, 1:17 am, Monkey Clumps <[spacebrai...@xxxxxxxxxx](mailto:spacebrai...@xxxxxxxxxx)> wrote:

On Dec 12, 8:18 pm, Willie.Moo...@xxxxxxxxxx wrote:

On Dec 13, 1:19 am, Monkey Clumps  
<[spacebrai...@xxxxxxxxxx](mailto:spacebrai...@xxxxxxxxxx)> wrote:

<SNIP>

Thanks for the explanations. Once again, it sounds like you have all of the angles thought out. Regarding the typhoon impact question, I had not realized your PV device was essentially embedded flush into the ground. I guess I imagined a bunch of devices on stands that would be blown away like dried leaves. If you are embedded, as you pointed out, the wind becomes a non-issue but water and mud a problem in a deluge, so it makes sense that you are concentrating on drainage.

The way it works for me is like this.

- (1) I have a crazy ass idea that might be useful.
- (2) I go down to my machine shop and fabricate a device
- (3) I send it to a local university I support for informal testing
- (4) I go back to #2 and repeat as often as necessary (small spin)
- (5) The idea works and has specific applications
- (6) I build a business model and note gaps, failings, cost excesses
- (7) I go back to #1 and repeat often as necessary (big spin)
- (8) I pay qualified engineers –the hairy knuckle type– to look at what I've got and pick it apart.
- (9) I have a practical system based on real-world experience
- (10) I note any shortcomings – if major go back to #1 (grand spin)

Re: Low Cost Hydrogen is here to stay

(11) I hire supply chain specialists and strategic analysts to develop a model

(12) I hire financial analysis to develop a financing strategy

#8 is important as anything.

Seems like a very reasonable approach. As an engineer who has interest in building a better mousetrap, I occasionally come up with ideas for revolutionary designs (although not in this field and not nearly as ambitious or complex as what you have done). Unfortunately i do not have my own machine shop at my disposal. So although I can create drawings and perform calculations on the computer, I essentially have to largely outsource the building of prototypes. This limits the amount of tinkering I can do, which is an impediment to success when engineering something new. I also have a "regular" engineering job which pays my bills and takes up most of my time, leaving my more creative interests on the back burner. So I am envious of your setup and your approach.

There's a difference between a 'toy' business plan in #6, and a theoretical business plan in #9 and a real-deal business plan in #12 with supplier agreements, customer MOUs, and LOIs from major banking sources.

For what its worth, I'm pretty impressed by what you are describing. It sounds like a real business plan and real technology that actually has a good chance of working, unlike most of the kooky BS that floats around usenet. It sounds like things are far enough along that you have actually demonstrated to the people that matter that it \*will\* work. I am amazed and appreciative that you would share so much info with a usenet audience.

The more people that are effective, the wealthier we ALL are.

Five or ten years from now we may be reading about you in Business Week rather than usenet.

Haha.. I recall how wonderful I thought Enron was when they were listed so many times as the world's best business and so forth, and Ken Lay always seemed to be in the news on CNN and so forth. I thought some of the their stuff was a little out there – but I figured they knew what they were doing and I wondered if I would ever be in that position?

## Re: Low Cost Hydrogen is here to stay

Then, I remember how appalled I was with everyone else as the truth strated coming out! Now, I don't know if I want ANYONE to read about me in Business Week! lol. I'd just like to make a difference and get paid, and see some of my ideas be used.

Well if your stuff takes off, the mainstream media will eventually take notice, whether you want it or not. Energy is too important of an issue for a new cost-effective source to be ignored.

Ken Lay and before him OJ Simpson, showed newscasters the way to get people glued to the set. The dramatic cycle of a hero gone bad, created in editor's minds a model guaranteed to sell media space.

That's why the news media these days creates a dramatic cycle around persons to sell air time. Sure, the public craves the next super-star. The next Einstein, Edison, Henry Ford. But how much copy did Marc Andreessen sell? Bill Gates? Some, but nothing compared to Ken Lay or OJ. The ticket is to build up a figure to be a hero, and then find a fatal flaw when the copy lags and tear them down to sell MORE copy. That's the trick.

haha.. I don't want to play that game. It must be great going up, but hell to pay on the way down.

Two final questions. Do you have any plans in the works to implement this technology in the US?

I have negotiated solar lease contracts with major mining operations and others in the United States for over 24,000 sq km of land. I have letters of intent with Union Pacific and others for rights of way for a hydrogen supply network from these lands. I have spoken with major buyers of fuel, such as airlines, about long-term low-cost supply contracts. I have worked with investment banks and received memoranda of understanding about when they would come in – that is when my deal would be bankable. I was invited to the White House by OSTP (Office of Science and Technology Policy) to discuss with their energy specialists my plans for the future and its strategic impact in the United States. Anyone who goes to

<http://www.usoal.com>

website and fills out the contact form and asks for a copy of the White Paper I gave at the White House on December 10, 2004 regarding our energy future (this is when the Saudi's went OFF the \$22 price limit, and the US was looking for alternatives) – I would be happy to send it to you.

## Re: Low Cost Hydrogen is here to stay

Well, in the fall of 2005 I was invited by a hydrogen vehicle manufacturer to a hydrogen conference to give a talk about hydrogen. While there the person who invited me invited me to lunch one day. He wanted me to meet one of their scientists. Another person joined us unannounced was the man in charge of Phillips Hydrogen division who wanted to tag along. Through the lunch he asked me about costs and asked if I could compete against steam reforming of methane. It was clear that I could compete head to head against steam reformed hydrogen, not only against their hydrogen, but against their natural gas as well. That's of huge concern to us, he said. You don't have much to worry about Fred. Why's that Bill? Cause if you have a low cost source of hydrogen, the highest best use of it is to trade it for coal, and then use the coal to make jet fuel. You have a bigger market, and get a bigger bang for your investment buck. But you'll go after methane eventually. Fred, I'm competitive against ALL fuels, obviously I'll compete in all channels eventually. I just won't go there first. We'll stick with things like diesel fuel and jet fuel.

Now, the deal with the airlines was secret. No one knew about it outside our board and the board of the airlines we spoke with. So, I was surprised when the Phillips guy said, "like the Jet fuel you're planning to sell to SkyTeam" I was speechless, blinking at him over my steak. What're you talking about Fred? C'mon Bill everyone knows you're taking advantage of the shortage in jet fuel to cut a deal with Sky Team. I didn't say anything. But, I have one question for you Bill. What's that Fred? How are you going to get the fuel to the planes? Well, I have a supply network, Federal law requires equal access. Sure, you can get it to the tanks at the airport. But how are you going to get it to the planes? Hire a truck to take it there. A Phillips truck maybe? You have to make those available Fred. If there's not a shortage, sure. If there's not a strike sure. IF there's spare capacity. I can tell you right now, there might be a lot of problems getting your fuel to the planes Bill, and then you have egg all over your face don't you? There's a shortage of jet fuel, airlines are going out of business because of fuel prices, you and everyone else are spending billions looking for new supplies. Cutting out a new supply in the way you talk about is cutting your own throat. Your analysis is incomplete. That's not the way my boss sees it Bill. Really? Well I'd like to talk to your boss and see if that's true. Not gonna happen Bill I have another question for you too. How big is your company? Not that big. Then how are you even going to hope to deliver how many tons of jet fuel a day? He named a figure. It was the right one. But I wasn't going to tell him. So, I laughed. You want me to verify your sources Fred? lol. But it was weird I'll tell you. How are you going to finance it. I said we have backers. He named the investment banks we had spoken with. The people involved. I was past being surprised and said, Fred, is this a fishing expedition. You trying to name who we talked to gauge my response so you can tell the accuracy or not of your information. I looked at my host. This is a wonderful

## Re: Low Cost Hydrogen is here to stay

conference Sam, I'm glad I came. Sam looked nervous. You know, those banks have loans to Phillips, do you think they want to jepordize those loans? This is bullshit Fred, they have loans to SkyTeam and every airtraveller in America, and every person who owns and automobile, and everyone else. They win some they lose some. Do you really think they give a shit about a home mortgage for under a million bucks when they have over thirty billion bucks bet on projects in the oil industry? Like I said Fred, more abundant energy made more cheaply, helps everyone, even you. Maybe, but I think you need to save that for the White House. We're not buying it. You're stupid then. Not stupid enough to let your hairbrain bullshit succeed. Is that a threat Fred? No, just a a bit of information you haven't considered. Fred, we're a supplier of fuel, we don't have a marketing organization. Does Phillip want to sell my hydrogen? You don't even have to take the risks. Make money you're making now. I act as a supplier. For hydrogen that might work, but not for the other stuff. Why not? You have suppliers for all your fuels. You're just a marketer. You deal with all sorts. Why won't you deal with me? You're an American. So? Do you know how long its been since we had a domestic supplier of fuel in America? Thirty years. Things change. You're a threat Bill. What the hell does that mean? What threat do I pose? That's none of your business Bill. You know a helluva lot about me Fred, why can't you tell me a litle about you? None of your business Bill.

Gee, I said, when you wanted to come along I thought you'd want to buy me out or cut a mutually beneficial deal to distribute my stuff at a fair price. Sam said, that's what I thought, but not before he beats the price down apparently, and laughs. Fred looked at Sam and Sam stopped laughing.

Well, this was a pleasant lunch, gentlemen, I think I have a few other things to tend to this afternoon. The bill comes. Wow that's a lot for a steak. If I were you Fred, I wouldn't pay it. Then I leave and take a cab back to the conference.

Three months later I was in trouble with a \$25,000 sale out of \$1,000,000 to a Pennsylvania man with the SEC, and my machine shop, which was a money maker for the past 20 years, saw major work dry up from long established customers like Honda of America said they weren't going to order stuff from us any more, and one of my major angel investors who ran a \$100 million a year paving business went belly up owing \$50 million after the bank pulled his credit line for some obscure reason, this just after I refused a \$100 million buyout from a Florida investment group who had no plans to develop the technology after they acquired it, and I felt that the structure they wanted would leave me holding a note and not much cash, and my second angel investor suffered reversals too at that time which caused him to lay off workers and downsize.

I don't know that these are related, in business shit happens, and its

Re: Low Cost Hydrogen is here to stay

hard to tell – but the timing is interesting.

It is quite disturbing that a promising new technology would be squeezed almost out of existence by the "old guard" in order for them to maintain the status quo. I am also surprised that Phillips would have the clout to squeeze you like that. I am not sure why they didn't offer to buy you out or sell your product. I guess they have too much invested in the current technology and felt safer trying to crush you. It is disturbing to me that the market system can work this way, but I guess that is why anti-trust laws came into existence.

Meanwhile, I had a child with a beautiful young woman in Switzerland, and I bought a house there and set up a trust for my daughter there. I learned a little about international trading and banking, and I met socially with some Dutch bankers and learned a lot about the way the major oil companies were structured. So, I decided to market my stuff away from the major energy markets. Not for any logical reason other than I felt better doing things that way.

Its hard to explain, I felt SAFER in Switzerland, I felt more at ease dealing with companies and people I had never heard of before in a culture different than my native American bang bang gangsta rap shoot em up culture – after the hydrogen conference that is. No logical reason. Just a gut feel. So, that's what I did.

Well America is a big and diverse culture. The bang, bang gangsta stuff is only a small sliver. That said, I can understand feeling safer in Switzerland given who much that Phillips guy knew about you. And Switzerland does look like one of the most beautiful spots on the planet, based on the photos I've seen.

Now, Accenture said early on that if I occurred in the energy supply chain in the right position I would be welcomed by the majors. I would only attract negative attention if I tried to build a retail operation in America. So, I went after the SkyTeam thing and others as a wholesaler. I didn't include buying trucks and putting them at every airport. It saves a huge logistical nightmare, people jealously guard their rights there. But, its dumb at that level not to deal with a wholesaler. Not dumb of your parent tells you not to. SO, this is what I couldn't figure – WHY did I attract negative attention? I \*was\* a wholesaler. SO, it didn't make sense. Then, I wondered where the leaks had occurred? Vendors? Bankers? OSTP? Inside my own organization? it could happen anywhere and everywhere. That was all secondary – emotionalism. Fact was, I had ALREADY attracted negative attention and ran into a spot of bad luck. By the grace of God and sheer luck, I'm a resident of Switzerland –still a US

## Re: Low Cost Hydrogen is here to stay

citizen— and have some assets off shore, and a wonderful baby daughter, and a second chance to build this thing up. So, since 2005, that's what I did.

In the US my plan is as follows;

- (1) build up offshore supplies of petrol production
- (2) leverage the value of that to buy an oil retailer
- (3) convert the retailer to an integrated oil company using my supply
- (4) use the increase in valuation to expand the chain nationally through additional acquisitions
- (5) sell hydrogen at the retail level
- (6) enter a price war for petroleum products
- (7) run the oil companies out of business
- (8) displace oil, coal and natural gas with hydrogen wherever and whenever
- (9) show no mercy, take no prisoners, make no apologies
- (10) dominate the energy market in the US

Small plans I know, but Phillips and all their lackeys have now attracted MY negative attention, and I'll do whatever I reasonably can to compete with them and defeat them honestly in the market place.

Well as an energy consumer I applaud your efforts.

Secondly, on the issue of automotive technology, where do you think things will go? For the interim, your system could generate gasoline from the abundant coal we have in this county. Of course the carbon in the coal will still be released, but by combining it with hydrogen at least we get more energy out of it than if it was just burned as coal in an electric power plant.

I have more in my OSTP white paper. Basically, the order of battle is;

- (1) build solar panels on the land I have leases on
- (2) build a hydrogen pipeline to send gaseous hydrogen throughout the nation
- (3) burn hydrogen in power plants throughout the nation displacing coal, residual oil, and natural gas used for this purpose
- (4) take the coal residual oil and natural gas in trade polymerize the natural gas to form higher alkane liquid fuels hydrogenate the residual oil producing high quality liquid

Re: Low Cost Hydrogen is here to stay

fuels

use solar hydrogen to hydrogenate coal directly making liquid

fuels

(5) sell the liquid fuels through your newly acquired retailer at a discount

(6) sell hydrogen directly at the retail level.

Item 2 sounds particularly expensive and difficult. This would be an easy place for political, corporate or environmental concerns to block you. How do you obtain the land rights to run a pipeline? You would probably have an easier time building a new power plant next to your solar site and sending the electricity in to the grid. Or you take the energy penalty and liquify and transport via tanker train or truck. A pipeline would be great, but I would imagine the costs and risks are enormous.

Now, the US in 2003 burned 1,100 million tons of coal producing 3,600 million tons of CO<sub>2</sub> in the process. The US also consumed 6,800 million barrels of crude oil and 550 million tons of natural gas. Now, 178 million tons of hydrogen replaces the coal. I take the coal in trade for the hydrogen, and the utilities that burn coal now, eliminate their carbon pollution. Simple. They're ahead I'm ahead. Now, I add another 98 million tons of hydrogen to the 1,100 million tons of coal to create 7,700 million barrels of 'suncrude' – which is more than the US needs. The US from my efforts alone, has a surplus to export. This gives the US (me) the capacity to set oil prices, by controlling this surplus – taking it away from the Saudi's who NOW have a surplus. This is a HUGE strategic benefit to the US. We should be doing this NOW. My cost of production is about \$18 per barrel. Less than the SHIPPING COST of oil from the Middle East. Its domestic. HALF the energy in the 'suncrude' comes from the Sun – and America ELIMINATES 3,600 million tons of carbon emissions – MORE THAN HALF.

Now, because at this level I can set prices, and actually at a far smaller level (400,000 b/d) I can acquire a retail operation and set prices at the retail pump about 10% below the market rate AND add hydrogen pumps at retail and sell THAT 15% below the market rate – which puts downward pressure on prices and squeezes the profits of other oil companies.

That would be cool.

If

people like you can actually provide hydrogen in an environmentally

## Re: Low Cost Hydrogen is here to stay

friendly and economically competitive manner, it seems like using hydrogen directly as automotive fuel could be a possibility.

It is a possibility. It occurs MORE rapidly if I sell petrol to earn money from my hydrogen, and use that money to build a retail operation and then use the retail operation to take market share from the majors, and add hydrogen to that channel at the appropriate time.

Put it this way. If I set up a hydrogen gas station on every street corner it would be an oddity.

If I set up a Sunoco/Citgo station and change their name to SUNFUEL—and tout that HALF the energy comes from pure sunlight, the other half from US mined coal—and every ton of coal has an offsetting carbon credit—and NONE of the energy comes from the middle east—and furthermore if I get on TV and talk like Tom Bodet on Motel 6—and COMMIT to my customers that I will monitor my competitor's prices and sell my sunfuel at 10% below market rates—WHAT A BRANDING AND MARKETING OPPORTUNITY THAT IS!

Then when the business is going great guns, I take a portion of the profits and commit to sell increasingly large percentages of my total energy sales directly as HYDROGEN—and I commit a percentage of my profits to auto manufacturers as a gift to support hydrogen vehicle PRODUCTION.

Quite a few manufacturers seem to be pursuing hydrogen powered vehicles on their own. I found this to be a surprising considering that hydrogen is \*currently\* expensive and not environmentally friendly when you take into account the fossil fuel required to produce the hydrogen. Yes they can brag about zero tailpipe emissions but the overall emissions are going to be high. Now the technology you bring to the table could change that to so that affordable and emissions-free hydrogen is a reality. But I doubt the automakers had you on their radar when they decided to spend millions in R&D to develop the hydrogen car technology. Did they assume that a breakthrough would eventually come with hydrogen production? How close are other to developing \*affordable\* zero-emissions hydrogen?

Of course the system you describe produces hydrogen gas, I am not sure if the energy required to liquefy it would make it uncompetitive with fossil fuels.

The energy required to liquefy hydrogen amounts to 20% of the energy

## Re: Low Cost Hydrogen is here to stay

it contains. It also takes an equal amount of energy to gasify the liquid. Some say this means only 60% of the energy remains. This logic is hogwash. That's because this energy cost doesn't remove that energy in the gas tank, its energy spent at the refinery or energy that's free heat from the environment, especially when you consider that most engines produce heat.

The same thing happens with gas. nearly 15% of the energy in a gallon of gas is needed to refine and process it. Another 3% is needed to vaporize the gas in your carburetor. Does this reduce fuel economy? Not really. The 15% of fuel used at the refinery doesn't come from your tank, and neither does the 20% of the energy to liquefy hydrogen. The 3% needed to vaporize gasoline comes from the heat in the environment around your engine. Ditto with liquid hydrogen. That's why BMW chose liquid hydrogen for use in their hydrogen BMW.

<http://www.bmwusa.com/unique/bmw/efficientdynamics?panelid=4>

Hydrogen fueled vehicles need 200 to 300 liters of tank volume, which is huge by comparison to gasoline tanks. Yet the cost of these tanks and the volume of these tanks is easily sustained when considering the overall volume of the car and cost of the car. That is fuel tanks take up 1% of the volume and 0.1% of the cost of a car. If they're 3x more volume, and 20x more expensive, WHO CARES! That means that hydrogen cars will have 3% of their volume allocated to fuel tanks and be 1.9% more costly. Given the advantages that hydrogen affords consumers, I think most buyers would go hydrogen, especially if the cost of hydrogen were 15% under the cost of petrol!!

I would agree. Forgive my ignorance on the subject since I am sure the following questions have been discussed here to death. Does the hydrogen in the tank stay in liquid state due to pressure or temperature? If the latter, how much additional volume is the insulation going to take up and how significant are the boil-off losses? If the tank is pressurized and the liquid at ambient temperature, how high is the pressure to keep the hydrogen liquid? If the tank was compromised in an accident, wouldn't the pressurized hydrogen go off like a bomb?

Then there is also the model that the power plants start burning the hydrogen and we go to electric "plug-in" car, provided the battery technology can get there. Your thoughts?

From 1936 to 1950 the major oil companies eliminated the only electric car technology that could compete with gas powered cars – electric cars powered by the roadway. Think of slot cars or electric train sets.

Re: Low Cost Hydrogen is here to stay

[http://en.wikipedia.org/wiki/National\\_City\\_Lines](http://en.wikipedia.org/wiki/National_City_Lines)

These vehicles need NO batteries. So, this is something for engineers to think about. I think it interesting that electric trains and electric trams are common in Europe and unheard of in the US.

[http://hampage.hu/trams/TdT2/e\\_bern.html](http://hampage.hu/trams/TdT2/e_bern.html)

National City Lines is why.

I also find it odd that there is no research to speak of to electrify our roadways so that a lightweight batteryless car could motor about for pennies per day – sharing the road with fueled cars. There are some who are promoting PRT systems that need a private roadway and need to develop a driverless technology. This just adds to the cost complexity and difficulty. But just as Berne's trams share roadway with cars, here is no reason a simple power coupling couldn't be worked out and installed in existing roads at low cost, and simple low cost automobiles made to use them that people can drive today

If I am ever in a position to do so, I would certainly spend money on this technology and see where it leads.

I think people like the freedom to take the occasional dirt road, stray off the beaten track, even if they rarely do so. Relying on a power source embedded in a roadway would severely curtail that freedom.

Now, answering your question directly – there are only two technologies of which I am aware that are cost competitive and performance competitive with gasoline or hydrogen when you look at the drive train – and also have the potential to be cost competitive as well – that is;

- (1) regenerative fuel cells
- (2) sodium sulfur batteries

[http://pdf.aiaa.org/preview/CDReadyMIECEC03\\_846/PV2003\\_5937.pdf](http://pdf.aiaa.org/preview/CDReadyMIECEC03_846/PV2003_5937.pdf)  
<http://gltrs.grc.nasa.gov/reports/1999/TM-1999-209429.pdf>

They're about equal in terms of power to weight – that is, a kg of 'fuel' in the form of a battery or fuelcell system – is about 800 Wh/kg. Gasoline is about 12,500 Wh/kg. This is the best! But this is only part of the story! Because we really should be looking at the entire DRIVE TRAIN.

In a gasoline powered car you have;

Re: Low Cost Hydrogen is here to stay

## Re: Low Cost Hydrogen is here to stay

- (1) gas tank
- (2) internal combustion engine
- (3) air intake and handling
- (4) exhaust
- (5) radiator
- (6) transmission

In an electric car (slot car type) you have

- (1) electric motor (direct drive)
- (2) pick ups

In a battery powered car you have

- (1) electric motor (direct drive)
- (2) battery

or a combined system;

- (1) electric motor (direct drive)
- (2) battery
- (3) pick ups

Now, electric motors are 1/8th the size and weight of an equivalently powered internal combustion engine. Electric motors because of the way you can change voltage and current, need far less transmission hardware. So, as the reports I cited above conclusively show, electric vehicle DRIVE TRAINS are SMALLER AND LIGHTER and an equivalent drive train using gasoline EVEN THOUGH THE FUEL TANKS ARE BIGGER.

The only thing lacking is that they are not cheaper. This only takes sufficient investment in manufacturing to compete head to head with gas – if you choose your technology correctly – and these two are so chosen – and that's another something I would like to do one day if I get the chance.

It seems the government knows the current gasoline driven automobile culture in the US can not be sustained indefinitely. They will probably back an alternate approach if they think it can work. The American car manufacturers have already lost much of their clout to shape the future of this country. They are currently on life-support as it is and things are only going to get worse as gas prices continue to rise.

.