Re: Solar−hydrogen home power system?

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From: Ray Drouillard (*cosmicpam2_at_comcast.net*)
Date: 10/21/04

Date: Thu, 21 Oct 2004 00:22:27 −0400

In what way? Because I don't believe that hydrogen is economically feasible right now? If you look at the top of the thread, you'll see that my first post said exactly that.

I may agree with the conclusion, but I see a whole lot of bad science used to prove the point. I am trying to correct the bad science. The biggest blooper is the one where someone equated a hydrogen chemical explosion with an H−bomb. That was a real howler.

Ray Drouillard

"Gymmy Bob" <nospamming@bite.me> wrote in message news:jeGdnT953d4RkurcRVn−hA@golden.net...
> Sounds like a backpaddle for the "speak too soon foolish"
>
> "Ray Drouillard" <cosmicpam2@comcast.net> wrote in message
> news:2tofefF21iggsU1@uni−berlin.de...
> >
> > "Dan Bloomquist" <EXTRApublic21@lakeweb.com> wrote in message
> > news:4176DEE2.2040003@lakeweb.com...
> > >
> > >
> > > Ray Drouillard wrote:
> > > >
> > > >
> > > > 40% Is a whole lot better than the "less than none" that Don
> > Lancaster
> > > > keeps quoting. As a matter of fact, I'm beginning to believe
that
> > he
> > > > has the whole spiel stuck in a text file for quick addition to
his
> > > > prose.
> > >
> > > Capital cost needs to be considered. On the other hand, Mr.
Lancaster
> > > has wave his hands around about wind and PV being energy sinks.
Past

> > > research has shown otherwise.
> >
> > Capital cost is economics, not engineering.
> >
> > Effeciency is engineering, not economics.
> >
> > They can be related, but the person expressing that relationship
needs
> > to be explicit.
> >
> >
> > >
> > > I went and fetched Grahams post for you:
> > > > > > This is it:
> > > > > > 41 percent (of delta 'G' of hydrogen oxidation to water
vapour)
> > > > > > for the fuel cell spec'd at
> > > > > > http://www.ballard.com/resources/powergen/NexaSpecSheet.pdf .
> > > > > >
> > > > > > Raising specific power −− only 1.2 kW over 13 kg −−
> > > > > > to levels adequate for a car prime mover drops the
efficiency,
> > > > > > I guess, by a third. Then there are inverter and motor
losses,
> > > > > > and we're down to 20 percent.
> > > >
> > > However, I don't agree to his 50% hit in the implementation. The
EV
> > side
> > > of the power train can easily do 85−90% net. There are source to
wheel
> > > traction systems that run 90% to 97% over most of thier
power/speed
> > range.
> >
> > Agreed.
> >
> > With 65%+ efficient fuel cells, and 90%+ motors, a vehicle can turn
> > hydrogen into motion very efficiently. The main bugaboo is storing
the
> > stuff (an issue that has been debated hotly in this thread).
> >
> > There are now 60%+ efficient methane−fuelled fuel cells. I know of
none
> > that are commercially available, unfortunately. If they do become
> > available, they would be ideal for running an ev because the methane
> > storage technology already exists. It still isn't as energy dense
as
> > gasoline, but it's a lot more dense than hydrogen. It also has the
safe
> > ty advantage of dissapating and floating away in the unlikely event

of a
> > *pressure tank rupture.*
> >
> > *Thirdly, it's a real fuel −− not something that is derived from a*
fuel.
> > *It can be mined, or very easily created from biomass.*
> >
> >
> > >
> > > >
> > > > *I still want more details about that 40%. I'm hearing figures*
> > *anywhere*
> > > > > *between 60% and 90% for both electrolysis and fuel cells. Where*
is
> > *the*
> > > > > *hard data?*
> > >
> > > *Crunch the numbers for your self, on that PDF above for that*
mighty
> > > *pricey PEM unit, if you don't believe Graham.*
> > >
> > > > *Yes, I can google until I'm blue in the face and crippled*
> > > > *from carpel tunnels, but some of those quoting the efficiencies*
> > *ought to*
> > > > > *have real data somewhere.*
> > > > >
> > > > *If we have electrolysis going at 80% efficiency, and a 70%*
efficient
> > > > *fuel cell (just to throw in some reasonable numbers). you have a*
> > *total*
> > > > > *efficiency of better than 50% (allowing for some modest storage*
> > *losses).*
> > >
> > > *Electricity to wheels. Electrolysis 80%, storage 90%, PEM 40%,*
vehicle
> > > *85%. So you net 25% of your electrical input. There are EVs in*
> > > *production that net better than 50% now. Also, compare the capital*
> > *cost.*
> > > *Hydrogen, rough guess, will run some 5 to 8 times an EV commuter.*
> >
> > *It pretty well goes without saying that making hydrogen from grid*
> > *electricity is a no−win situation.*
> >
> > *As far as comparing a hydrogen system to a battery system −− well, I*
> > *expect the battery system to win when you consider efficiency. The*
> > *biggest obstacle for EV transportation is the lousy range of even*
the
> > *best vehicle. It would be worth it to some people to give up some*
> > *efficiency just to get more range.*
> >
> > *Getting back to the original post, though −− he was talking about a*

> > totally fixed application. The electricity −−> hydrogen −−>
electricity
> > idea had occurred to me, too. I was pondering what to do with cheap
> > solar cells of those much−promised organic semiconductor cells
become
> > available at a reasonable price. At the time, I lived in the city,
and
> > was limited to the area of my (small) roof. Therefore, storage to
pick
> > up the slack in the winter would be a necessity. Since we also had
> > natural gas piped in, I planned on generating any additional
electricity
> > needed using a natural gas fuel cell. The waste heat would be used
to
> > heat the house.
> >
> > Now that we live on a nice ten acre parcel, I'm not nearly so
limited
> > when it comes to the area that I can cover with solar cells. That
makes
> > it more feasible to get enough area covered to produce a day's worth
of
> > electricity on even the shortest day. That cuts the storage
> > requirements considerably −− both in quantity and time. Hydrogen
> > wouldn't be necessary at all.
> >
> > Of course, all of the above depends greatly upon the much−promised
cheap
> > solar cells, as well as the availability of relatively inexpensive
fuel
> > cells.
> >
> > Then, of course, there are things like inverters and/or DC
appliances.
> > The ceiling fans would have to be ripped out and sold. I would also
> > have to find something to replace the compact fluorescent lamps that
we
> > have used to replace almost every incandescent light in the house.
I
> > would probably use regular red, yellow, green, and blue LEDs in
fixtures
> > that allow the light to mix because that is more efficient than
using
> > white LEDs (for very good quantum physics reasons).
> >
> > Incidentally, the cheapest way to save energy right now is to
replace
> > all your incandescent lights with fluorescent lighting. Soon, LED
> > lighting will be more available.
> >
> > So, my next realistic step is to make a digester to turn organic

garbage
> > *into methane. I don't expect to find an affordable methane fuel*
cell
> > *any time soon, so if I get more methane than I can burn in my*
appliances
> > *and vehicles, I'll use it to fuel a standard CNG generater, and use*
the
> > *waste heat to heat the house. Lots of research has to be done*
before
> > *getting anywhere near that far, though.*
> >
> >
> >
> > >
> > > >
> > > > *If you want to compress the hydrogen to store it, and if the*
energy
> > *cost*
> > > > *of that is significant, you can recover some of the energy by*
using
> > *an*
> > > > *'air engine' to decompress the hydrogen before it is fed into*
the
> > *fuel*
> > > > *cell.*
> > >
> > > *Capital cost and energy density.*
> > >
> > > >
> > > > *Also, in a solar energy system, you are going to be getting more*
> > *energy*
> > > > *in the summer than in the winter. That means that you will be*
using
> > *the*
> > > > *fuel cell in the winter if your solar array is sized such that*
you
> > *need*
> > > > *to store power in the summer for use in the winter. In that*
case,
> > *the*
> > > > *heat that is generated by the fuel cell can be used to heat the*
> > *house.*
> > > > *In that way, you can use 100% of the energy that you have stored*
in
> > *your*
> > > > *hydrogen tanks. Any inefficiencies end up heating the house, or*
> > *maybe*
> > > > *even cooking the meals (depending on how 'retentive' you want to*
be
> > *when*
> > > > *designing the system)*

> > >
> > > *It will never ever make sense to use hydrogen in a terrestrial*
> > > *application. Just run some numbers and compare them to the*
> > *alternatives*
> > > *that are presently applied.*
> >
> > *I won't argue that point. Before I buy the equipment needed to*
> > *generate, store, and use hydrogen, I will build a big water tower*
and
> > *use my excess energy to pump the water uphill, and use a turbine or*
> > *water wheel to get the energy back. As a bonus, I'll also have*
either a
> > *swimming pool or a fishing pond.*
> >
> > *I might argue with the people who are scared to death of hydrogen,*
or
> > *those who say "less than zero", but I have already throught through*
the
> > *hydrogen−as−a−fuel situation to have a good handle on what it would*
take
> > *to make that practical. On a large scale, off−shore nuclear energy*
> > *would make it a good option. On a small scale, it would take a very*
> > *specific set of conditions to make it worthwhile.*
> >
> >
> > >
> > > >
> > > > *Certainly, the cost of photovoltaics makes the system*
uneconomical
> > *now.*
> > > > *But, this is rec.arts.sf.science, so speculation of future*
advances
> > *in*
> > > > *the art are definitely on topic.*
> > >
> > > *Sure, we could see thin film at a buck a watt. Still not cheap.*
I've
> > > *been reading about it for years and I still don't see it*
happening.
> >
> > *I'm talking about organic semiconductors, which may very well be*
made
> > *very cheaply. Still, I'll believe it when I see it. I'm hopeful,*
but
> > *far from convinced.*
> >
> >
> >
> > > > *If I could go out and buy a bunch of plastic sheeting that*
converts
> > > > *light into electricity with an efficiency of about 8% for a few*

> > cents a
> > > > watt, what would I do with it? Putting it on the roof would be
a
> > good
> > > > start. Storing power in batteries short−term for use at night
would
> > > > also be a good idea. In fact, I can save on the cost of an
inverter
> > if
> > > > I use a bunch of batteries in series and store it at 180V, then
just
> > use
> > > > some MOSFETs to generate a pseudo sine wave output −− no
> > up−converting
> > > > switching regulator, no muss, no fuss.
> > >
> > > As a past poster would say, 'If we only had some ham, we could
have
> > ham
> > > and eggs, if we only had some eggs...'
> > >
> > > Inverters are $.50/watt, off the shelf. No muss, no fuss.
> >
> > They will probably be cheaper once electric cars come more into
> > production. Right now, high−power switching transistors and fast
> > high−power diodes keep the prices up.
> >
> > >
> > > Qusetion, why hydrogen?
> >
> > Because it's cool?
> >
> > Remember, I'm not advocating the hydrogen solution. I have thought
it
> > through, and share the conclusion of some or the people I am arguing
> > with. I don't share their reasoning, however.
> >
> >
> > Ray Drouillard
> >
> >
> >
> > >
> > > > Ray Drouillard
> > >
> > > Best, Dan.
> > >
> > > −−
> > > http://lakeweb.net
> > > http://ReserveAnalyst.com

> > > *No EXTRA stuff for email.*
> > >
> >
> >
>
>