

Re: World's First Fuel Cell–Powered Train Locomotive Slated for 2008

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From: Ian St. John (*istjohn_at_noemail.ca*)

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Stephen Sprunk wrote:

> "Ian St. John" <istjohn@noemail.ca> wrote in message
> news:LjWRc.7915\$a65.396799@news20.bellglobal.com...
>> Stephen Sprunk wrote:
>>> An SD90 has 4400hp. Long–distance freight trains in even lightly
>>> rolling terrain may have two to six SD90s at the front (and
>>> sometimes more at the back) of the consist. You think railroads
>>> want to quadruple the number of engines they need?
>>
>> Because they want BIG trains to reduce the number of switching
>> decisions and personnel requirements.
>
> That doesn't justify using 24 FC locos where six diesel locos will do.

This is really stupid. There is nothing to say that FC locomotives cannot be made in 4,000+ hp varieties. The size of the current one is exactly right for the job it is doing. They even downsized a larger model because it was oversized for the job. Now you want to use 24 light duty yard switchers to pull line freight trains?? Do you have ANY clue?

> History shows the RRs want the biggest locos they can get for
> long–haul routes, rather than stringing together a dozen (or two)
> tiny locos.

Sure. P.S. nice illogical non–sequitor or is it a red herring? If they build FC line haulers they will be sized to the job. Fuck, you are clueless. Were you always this dim or is it due to brain damage?

>
>>> If diesel were banned for environmental reasons, the railroads (the
>>> few that wouldn't go bankrupt) would simply electrify their lines
>>> and switch to 6000hp electrics. It's a lot simpler, cheaper, more
>>> proven than any hydrogen–based "solution".
>>
>> No. They would probably first adapt to turbine electric power. The
>> electrification of the rail is more costly.

>

> *And what fuel would they be using to spin those turbines?*

JP4 or something equivalent like diesel.

> *Why not just use that fuel to power a more conventional ICE?*

Beats the shit out of me. I have to assume you have some reason for eliminating diesels as an option. But it is your delusion. I cannot read your mind to estimate your motives.

>

>> *Only because they are massive as hell and this produces both long
>> service life and low rpm/power output. The precombustion chamber
>> diesels that are popular in europe have much higher revving and
>> response but wear out about as fast as a regular engine since the
>> pistons and so on are of the same strength, not having to resist the
>> explosion forces of the fuel.*

>

> *Most long–distance freight in Europe is electric; the diesel engines
> they use are mainly for switching and short–haul movements. Totally
> different requirements.*

The reason they use electrics is mostly because they want high power, low cost, and low weight for high speed rail systems. Other than electric rail the only other way to have such light weight high power is by turbine engine and if you look at high speed rail proposals for the U.S. you will notice that as the engine of choice.

Having power delivered from the lines reduces the weight of the locomotive part allowing for a relatively light weight locomotive and cars with the power to haul at high speed. Obviously, the same pressures would exist in the U.S. if they made a similar investment in high speed commuter freight, but let us not talk about fantasies. The U.S. requirements for rail will be for slow speeds, heavy cargo and passenger rail will be an afterthought. WAY too many level crossing.

>

> *And that still doesn't address the issue that US RRs expect a loco
> engine to last 30+ years. If buying six locos that lasted 5 years
> each were more cost effective, they'd be doing it.*

And yet, replacing the batteries every five to ten years or even rebuilding the PEM cell would be a simple thing. Relative economics will be the real issue and that is not yet known. Diesels in the 4,000 hp class are not cheap either.

Are you babbling to hear yourself think or do you think you have some universal principle or unconquerable problem that will force things to go your way. And what way is that? Sometimes I think you are arguing for electrified rail and other times you seem to be saying that diesels will

never be replaceable.

>

>>> *A rebuild doesn't mean replacing the engine. A
>>> current FC will require 15–30 replacements during the expected
>>> lifetime of the loco, presuming they can even last a year or two in
>>> the heavy industrial conditions of a railroad -- unlikely for now.*

>>

>> *And none of this has to do with the lifetimes of fuel cells. New
>> technology may change this fairly soon as the main problem is the
>> Nafion membrane that is the 'standard' for PEM fuel cells. There is
>> one company that expects fuel cell prices capital costs to reach
>> \$100/kw with it's technology.*

>

> *Let us know when it arrives, can be manufactured in volume, has the
> durability of an ICE, and has been proven in the field. Until then
> it's an experiment.*

Yup. Obviously we are not talking about the past. Or are you too dim to notice?

>

>> *And if you have ever seen one go to full power you know that it
>> matters hardly at all if it is idling or stopped. The smoke coming
>> out is a signal of the fact that diesels produce most of their
>> pollutants while changing power levels.*

>

> *Modern locos I see every day do not emit visible smoke when changing
> from idle to full–power operation. I wouldn't be surprised if older
> ones did, but you have to compare to the current state of the art.*

I would expect some sort of soot suppression then. The physics of adding a rich mixture to increase RPM just don't change. Rich mixtures do not burn completely and unburned fuel becomes soot.

>

>>> *This means FC
>>> locos would gain a bit of ground, but the same is true of electric.*

>>

>> *What is your thing with electric? Anyway, if you take the example
>> of the 'green goat' or even the 'green kid' hybrids save about 50%
>> of the fuel in typical intermittent operation. Not insignificant
>> considering their thirst for fuel in major quantities.*

>

> *Most diesel locos already are hybrids, just without the batteries
> needed to store excess/regenerated power.*

So they are diesel electric, not hybrids..... Halfway hybrids or whatever. It just points to there being easy to convert to hybrids. Just add battery storage and charging controllers.

- > *A switcher would benefit*
- > *from such, but long–haul locos tend to maintain constant speeds for*
- > *hours at a time; the weight of the batteries would offset any gains*
- > *made during (rare) acceleration events.*

No. The engines of pretty well any transport system are sized for peak power. Aircraft do it on takeoff. Locomotives do it on hauling through the mountains. Cars do it to accelerate onto the highway. Etc. Hybrids have the advantage of being able to 'borrow' from the batteries to reduce the size of the engine required for those peak times and not having to idle the engine when power is not needed just to have it ready when the line moves a little (more important in gasoline engines than diesels) .

Even with line haulers, for heavy loads, or mountain passages, they tend to add other engines and so the equation still ends up that engine capacity are much higher than average loads. Say there was a four engine frieght with three of the engines needed for a mountain pass. It may be that they can idle three of the engines on flat level ground once up to speed. This multiple engine frieght that can be 'customized' to the needs by shutting down engines, to do the same thing as hybrids. That jobs is to to allow peak power loads without the expense of a single massive engine that wastes fuel 90% of the time when not at peak loads.

I expect that line haulers, if built on the hybrid concept, would be 'light hybrid' with limited battery storage, just to add a short boost when needed for accelerating the train up to speed. Actually I expect that the rail companies will not bother as they don't have any pressure to make such savings and there are few companies more conservative than U.S. railroads. The line switcher is another story, of course.

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