LESSONS LEARNED ON THE TRACK TOWARD HYDRAIL

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Ryerson University
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by Stan Thompson for the
MOORESVILLE HYDRAIL INITIATIVE
Mooresville/South Iredell Chamber of Commerce
And the Mooresville Morning Rotary Club
Mooresville, North Carolina, USA
Why hydrogen streetcars are the “low-hanging fruit” of hydrail:

- Hydrogen FC buses are already widely deployed.
- The same power system can propel a steel-wheel version with only 1/5 to 1/7 the energy per passenger.
- Compared to the H2 streetcar, propelling an H_2 bus is like riding a bicycle with a flat tire.
- In 2007 the full cost of tram electrification in the US was approaching US$ 4 million+ per km of track and may be US$ 6 million or more per km by now!
Bad timing was had by all:

DENMARK’S VEMB-THYBORN LINE — R.I.P. 2007

JAPAN’S RTRI DEMO — R.I.P. circa 2008

JAPAN’S J R NEW ENERGY DEMO — R.I.P. circa 2008

SPAIN’S ASTURIAS TRANVÍA — R.I.P.? 2012
EXISTING AND PLANNED (a/o 2006)

STREETCAR SYSTEMS = 81+

COURTESY, JIM GRAEBNER, APTA TROLLEY SUBCOMMITTEE.
The Great Catenary Rebellion

- Over several decades, cities have spent heavily to bury unsightly aerial utility plant; only catenary wires remain aerial.
- In Europe and Asia, especially, the public is finally beginning to notice.
Why *Europe*’s wireless trams are *not* fuel cell powered:

- The first wireless systems are in cities where trams have been *in place* for a long time.
- There is a huge embedded investment in rolling stock that can be *modified* as intermittent charging technology at *much* lower cost than purchasing new rolling stock.
- There’s no fiscal incentive to replace the plant.
ARUBA’S PRIME MINISTER, MIKE EMAN, AT CONTROLS OF WHAT WILL BE THE WORLD’S FIRST HYDRAIL STREETCAR TO GO INTO REVENUE SERVICE (FALL, 2013).

IN 2009, A BUILDER WHO OFFERED TO MANUFACTURE HYDRAIL STREETCARS IN NORTH CAROLINA WAS IGNORED … BECAUSE NO ONE HAD EVER HEARD OF THE TECHNOLOGY!

WE ARE HERE TO REMEDY THAT.
Network Rail losing millions from copper thefts

Copper theft from railway lines is so rife the rail operator has had to take on new staff, as well as pay compensation for delays

Network Rail workers in Sheffield repair and replace stolen copper wiring.
Photograph: Christopher Thomond for the Guardian
There is more vanadium, rubidium, zirconium or strontium in Earth’s crust than there is copper!

**THE COPPER CATENARY BARRIER**

India, China, and Brazil move into the “First World”
Low cost, mass generation of hydrogen is already here for the implementation.

University of Ontario Institute of Technology

Savannah River National Hydrogen Technology Lab

It’s only a matter of deploying thermochemical water-splitting using high temperature process heat.
For coronal mass ejections...

...power lines are big receiving antennae. Hydrogen pipes probably are not.
<table>
<thead>
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<th>TECHNOLOGY</th>
<th>TRAIN</th>
<th>CAR</th>
<th>DELAY</th>
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<td>1830s</td>
<td>1900~</td>
<td>70 years</td>
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<tr>
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<td>1976~</td>
<td>51 years</td>
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<td>?</td>
<td>2000s</td>
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It’s time to lure the genie out of the bottle for good…

…and get hydrail—especially hydrogen streetcars—into the *public conversation*!
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