THE HYDROLLEY:
FIRST STOP ON THE
MAIN LINE TO HYDRAIL

presented 3 July 2012 at the
7th International Hydrail Conference
Birmingham Centre for Railway
Research and Education
University of Birmingham, UK

by Stan Thompson
Hydrogen Economy Advancement Team
Mooresville/South Iredell Chamber of Commerce
Mooresville, North Carolina, USA
Why hydrolleys 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 hydrolley, propelling an H₂ 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!
A 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**
The Great Catenary Rebellion

- Over several decades, cities have spent heavily to bury unsightly aerial utility plant; only catenary wires remain aerial.

- The public is beginning to notice.
Bordeaux: Moving unobtrusively without disturbing urban space

Commercial service: December 2003
BOMBARDIER (Germany)

PRIMOVE Catenary-Free Technology
The city will introduce new electric streetcars that don’t run along traction lines, in order to clear up the number of overhead wires in downtown Shanghai.
KAWASAKI “SWIMO” (Japan)

Kawasaki Heavy Industries to unveil NiMH-powered SWIMO

By Darren Murph posted September 7th 2006 10:25AM

It's no secret that the engineering minds of the world are developing new ways to get you (and all your coworkers) around without making a pit stop at the fuel station. Joining the growing list of battery-powered cars, supercars, and even scooters, the SWIMO streetcar is set to make mass transit a greener endeavor. Kawasaki Heavy Industries (KHI) is making the wires most typically associated with trolley cars a non-issue with its "giga cell-powered" SWIMO. Rather than relying on fancy fuel cells, the juice is delivered from those tried and true nickel metal hydride batteries we've been using for years in less demanding applications. While you won't be
SIEMENS (Germany)

Phone Conference for the Press
Fiscal Year 2009 – third quarter

Peter Löscher
President and CEO of Siemens AG

Innovations in high end markets

On the revenue side, we are in an excellent position as a result of our innovation strength in high end markets. In this regard, three examples from our Sectors:

The first example is from our Industry Sector. It's the world's first streetcar with an energy storage, making operation without an overhead wire possible. This type of streetcar with hybrid energy storage can travel 2.5 kilometers without an overhead contact wire. Because they store
At Present, Kinki Sharyo
May not offers wireless streetcars.
However, it would be well worth inquiring
as to whether they would undertake
development if the FTA Office of Mobility
Innovation offered to fund the R&D ... with
Charlotte’s encouragement!
Why *Europe’s* wireless trams are *not* hydrolleys:

- 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.
- It’s in investors’ and operators’ interest to “milk” embedded trolley investment as long as possible.
But while it makes some* sense to modify existing trolley lines and cars, it would be absurd to plan new lines, given public opposition to aerial superstructure and the $10 million ± per mile surcharge for external track electrification.

*Only “some”, given the risk of copper theft and the salvage value of the metals if wireless hydrolleys were substituted.
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
EXISTING AND PLANNED (a/o 2006) STREETCAR SYSTEMS = 81+

Seattle, Portland, Salem, San Francisco, LA, San Diego, Tucson, Phoenix, Albuquerque, Denver, Colorado Springs, Spokane, Boise, Salt Lake, Sacramento, Austin, Houston, Corpus Christi, Kansas City, St. Louis, Des Moines, Minneapolis, Kenosha, Madison, Omaha, Chicago, Little Rock, Memphis, Dayton, Toledo, Cincinnati, Columbus, Lancaster, Philadelphia, Newark, Providence, Kinston NY, DC, Richmond, Roanoke, Atlanta, Savannah, Birmingham, Miami, Tampa, Grand Rapids, Boston, Lowell, French Lick Indiana, Charlotte, NC.

COURTESY, JIM GRAEBNER, APTA TROLLEY SUBCOMMITTEE.
IN VERY ROUGH FIGURES:

53 new US streetcar systems  
(times)  
(say) 7 miles average per system  
(equals)  
371 miles of planned new alignment  
(times)  
US$ 10 million per mile electrified  
(equals)  
US$ 3.71 billion in new planned catenary-related investment!
So, why isn’t the hydrolley happening?
The Media: “Accidental Engineers”

Average editor’s mental image of a hydrogen car.
The Media: “Accidental Engineers”

Average editor’s mental image of a hydrogen car.

Average editor’s mental image of a hydrogen train or tram.
## TRAIN / CAR CHRONOLOGY

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>TRAIN</th>
<th>CAR</th>
<th>DELAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam</td>
<td>1830s</td>
<td>1900~</td>
<td>70 years</td>
</tr>
<tr>
<td>Electric</td>
<td>1890s</td>
<td>1900~</td>
<td>8 years ±</td>
</tr>
<tr>
<td>Diesel</td>
<td>1925</td>
<td>1976~</td>
<td>51 years</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>?</td>
<td>2000s</td>
<td>none !</td>
</tr>
</tbody>
</table>
It’s time to lure the genie out of the bottle for good!

Please help get hydrail, and especially hydrolleys, into the *public conversation*!
Contact information for Stan Thompson,
Hydrogen Economy Advancement Team,
Mooresville South Iredell Chamber of Commerce

home/office phone: +704 664-5486
Cellular phone: +704 458-9410
e-mail: hst2nd@aol.com
Postal address: 518 Beaten Path Road
Mooresville, NC, 28117 USA