



U.S. Maglev Coalition

From: Brennan, John [John.Brennan@mail.house.gov]
To: 'Larry Blow'
Cc: 'J. Christopher Brady'
Subject: RE: Rep. Mica's high-speed rail forum today: Chris Brady's slides are attached.

Sent: Wed 3/21/2007 8:44 AM

Hi Larry/Chris

Thanks for the file. I was wondering if you could provide a few additional details about the following:

1. **Construction cost** - Chris mentioned that the cost of building maglev over open land would be about \$10M per mile as opposed to the \$60-\$100 million per mile figure we often hear. A \$10M/mile cost would compare pretty favorably with steel wheel construction cost. We need to separate the urban engineering and real estate issues (which are common to building any new rail line or highway) from the basic maglev versus iron track costs.
2. **Lifecycle cost** - now that the Shanghai system is running, is there any better idea of the true lifecycle cost of maglev? How would total lifecycle cost of maglev compare to steel wheel over 30 years?
3. Is it true that **maglev uses much more electricity** at equivalent speeds than steel wheel? If so, that is a concern.
4. **If we build maglev from DC-NY**, we would probably stop the Acela/Metroliner program and turn the NEC over to commuter & freight. This would greatly increase capacity for those uses and save huge costs for Amtrak. I'd envision that the catenary could be abandoned in freight-only zones and that the track could be downgraded to Class III in these areas. In commuter zones, there would no longer be any real need to maintain above 110 or perhaps even 89, as the focus would be slower, but more frequent service. **The implications are huge and I'd appreciate any comments** you might have.

Many thanks!
John

----- Response from U.S. Maglev Coalition 4-2-2007 -----

Note: Our responses are attached in the following four pages and we also include two companion documents for reference:

- A technical overview prepared by Dornier Consulting of Germany, "Technical-economic comparison of Maglev and High Speed [Rail] Systems" from May, 2006
- A Siemens Corporation brochure, "High Speed from Siemens"

Question #1:

Construction cost - Chris mentioned that the cost of building maglev over open land would be about \$10M per mile as opposed to the \$60-\$100 million per mile figure we often hear. A \$10M/mile cost would compare pretty favorably with steel wheel construction cost. We need to separate the urban engineering and real estate issues (which are common to building any new rail line or highway) from the basic maglev versus iron track costs.

Question #2:

Lifecycle cost – (a) now that the Shanghai system is running, is there any better idea of the true lifecycle cost of maglev? (b) How would total lifecycle cost of maglev compare to steel wheel over 30 years?

Answers to #1, #2(b):

First, as a general response to this multi-faceted question concerning investment and life cycle costs, we refer to the last (back-up) slide in Chris Brady's presentation, which frames our response in terms of the location of the construction, as Chris mentioned during the Forum, rather than in absolute monetary terms. Slide 13, "Cost Comparison: High-Speed Rail and Maglev," features a graphic taken from the Siemens brochure highlighting the Velaro high-speed train and Transrapid maglev.

- The text below the middle bar chart says that in comparing investment costs, "For normal topologies, investments for the track/guideway [for high-speed rail and maglev] are almost equal," and that "Magnetic levitation provides [cost] advantages in more demanding terrain."
- The same slide, with regard to life cycle costs, shows maglev having a shorter bar than the Velaro train for such costs, saying in the text, "...the magnetic levitation system offers [cost] advantages which are due to the absence of mechanical wear (running gear, brakes)."

Further, we understand from the Transrapid supplier that for a "turnkey" project, capital costs of \$40 - \$60 million per dual-track mile are typical for simple, longer routes and up to \$80 - \$100 million per dual-track mile are typical for shorter, more complex routes.

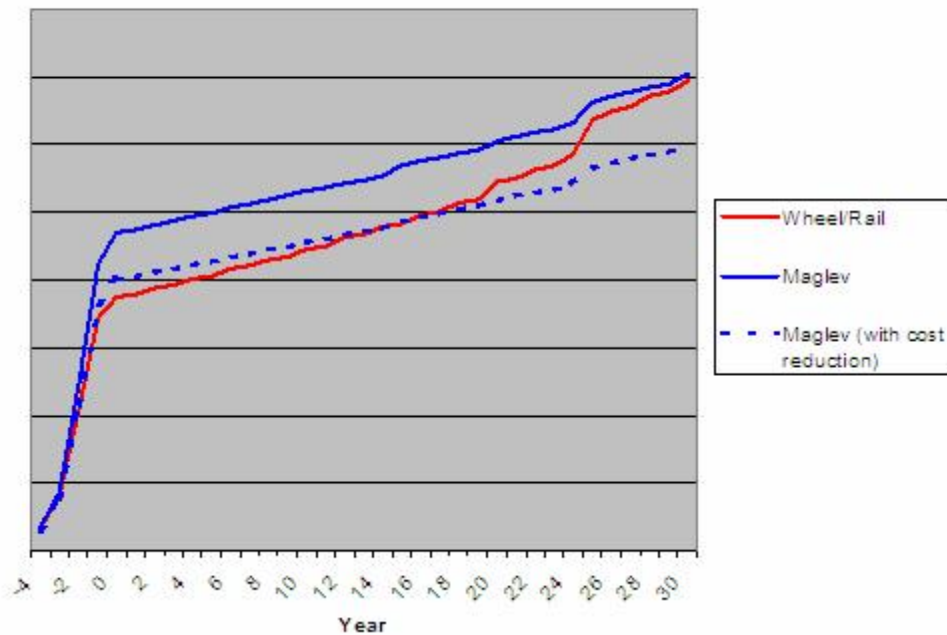
Second, we normally stress that when comparing costs for maglev and high-speed rail, a decision maker should consider that an investment in maglev, while almost equal to rail, immediately secures all the speed and maneuvering performance as well as the environmental and safety factors that are beyond the capabilities of rail. Additionally, there are positive spin-off effects of maglev — in terms of attractiveness, tourism, local economic improvements, prestige, high-quality jobs in supplier industries, etc. — that can contribute non-monetary benefits to a region and are not well quantified in most LCC assessments.

To the specific point of comparing costs between high-speed rail and maglev, we have also included a comprehensive technical overview prepared by Dornier Consulting of

Germany, "Technical-economic comparison of Maglev and High Speed [Rail] Systems," which was presented to the U.S. Maglev Coalition in May of last year. Among many other things it shows that, at least from the German experience, maglev offers similar life cycle costs (see the sample graphic below, taken from page 25) and, with potential cost reductions over time, maglev offers an even more attractive alternative to high-speed rail.

Analysis of the LCC

Total Cost Development for Maglev and for Rail



Question #2(a):

Lifecycle cost – (a) now that the Shanghai system is running, is there any better idea of the true lifecycle cost of maglev?

Answer to #2(a):

Unfortunately, our visibility into the actual costs of the Transrapid system in Shanghai is limited to what we see in the open literature and what little we hear from those people actually involved with the project, and there has been nothing useful of this sort in the media or from the project in several years. We suggest you approach the German Transrapid International consortium through its U.S. subsidiary, Transrapid International-USA, and ask for a response from them.

Their Web site is at <http://www.transrapid-usa.com>.

**U.S. Maglev Coalition Responses to House T&I Questions from HSR Forum
March 21, 2007**

Question #3:

Is it true that **maglev uses much more electricity** at equivalent speeds than steel wheel? If so, that is a concern.

Answer to #3:

No, that statement is not true. According to the companion Siemens brochure, "High Speed from Siemens," the following figures show a reduction in power consumption for maglev from 10% to 26% when compared to HSR at the same speeds:

High-speed rail / "Velaro"

<i>Power consumption</i>	200 km/h: 24 Wh/pkm
<i>(running at constant</i>	250 km/h: 34 Wh/pkm
<i>speed, with the</i>	300 km/h: 46 Wh/pkm
<i>HVAC systems on)</i>	

Maglev / Transrapid

<i>Power consumption</i>	200 km/h: 22 Wh/pkm
<i>(running at constant</i>	250 km/h: 29 Wh/pkm
<i>speed, with the</i>	300 km/h: 34 Wh/pkm
<i>HVAC systems on)</i>	400 km/h: 52 Wh/pkm

In the Dornier presentation, as an example, on page 18, the following chart shows a substantial reduction in primary traction energy — about a 30% reduction — in maglev's favor when it is forced to maintain the same trip time as a train along the same alignment. When it can run at more useful/faster speeds, however, maglev consumes more than 40% more energy, but it also reduces trip times by almost 35%. Trains cannot do this.

System Comparison

Energy consumption

	Wheel/Rail	modified MAGLEV	MAGLEV
running time including timetable reserves	32 min.	32 min.	21 min.
Design Speed	300 km/h	246 km/h	450 km/h
Energy supply	Substation 15 kV	Substation 20 kV	Substation 20 kV
Traction energy consumption	62,2 GWh/a	44,1 GWh/a	89,6 GWh/a
secondary energy consumption	6,2 GWh/a	13,2 GWh/a	13, 2 GWh/a

Question #4:

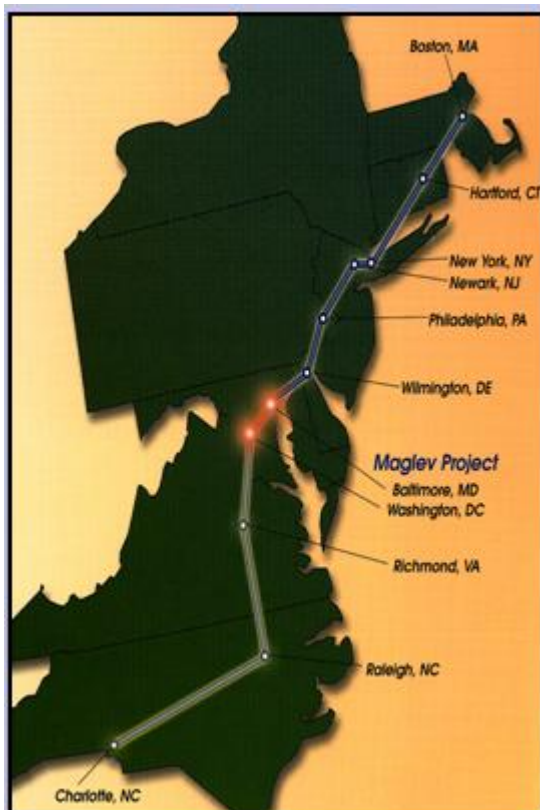
If we build maglev from DC-NY, we would probably stop the Acela/Metroliner program and turn the NEC over to commuter & freight. This would greatly increase capacity for those uses and save huge costs for Amtrak. I'd envision that the catenary could be abandoned in freight-only zones and that the track could be downgraded to Class III in these areas. In commuter zones, there would no longer be any real need to maintain above 110 or perhaps even 89, as the focus would be slower, but more frequent service. The implications are huge and I'd appreciate any comments you might have.

Answer to #4:

This is indeed a broad vision for the Northeast Corridor, and one that is shared by the Baltimore-Washington Maglev Project, one of our U.S. Maglev Coalition members, who have already considered the implications of using the current Amtrak/NEC alignment for the demonstration project connecting Washington, D.C., BWI Airport and downtown Baltimore. Their plan, shown below, is going through the Final Environmental Impact

Statement development phase with the Federal Railroad Administration and so far the approach to parallel the Amtrak alignment for this initial segment seems to be workable.

The project is described in more detail at: <http://www.bwmaglev.com>



A more direct response to your question, considering the implications of building maglev along the complete NEC, is one we would need some time to think about. We would appreciate having a face-to-face discussion of this concept and our initial thoughts in the near future.

----- End of response -----