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Webinar Question and Answer Transcript

Solar-powered Automated Transit Networks: The Future of Sustainable Urban Transportation (November 17, 2016)

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Q. Not too long ago another seminar topic was automated vehicles. Any thoughts on the two systems coexisting?

A. Buff Furman: We certainly envision this as coexistence and automated vehicles are certainly moving along quite rapidly and being used but we see ATN as certainly impacting getting other vehicles off the road as much as possible and serving to use current transit more efficiently as well as integrate into transit-oriented development. So, yes, I think they can coexist and we will be all the better for that.

Q. Why hasn't this system been able to attract city transportation officials?

A. Buff Furman: It actually has. But as I mentioned with the Catch-22, city officials are caught in a difficult spot.

Ron Swenson: One of the problems is that in ordinary situations I can build a product like a magical new artifact coming out of Silicon Valley and I put it on the shelf and anybody can choose to use it or not. Whereas when I go to a city and say I want to bring in a new form of infrastructure, it takes a very large consensus to be built and I think that the tools for building that consensus have been lacking and what we are now seeing is there are several cities around the world—not necessarily even in the United States or in Europe—where the need for some new form of transportation is developing. We have seen a great deal of interest in the last couple of years from India, from China, and from even Africa to see this technology at all.

Q. Given that the ATN podcar system is similar to an advanced amusement park ride, why haven't the transit R&D community brought these types of firms into their podcar efforts?

A. Ron Swenson: I would like to say that a number of people have been using these technologies and we are beginning to see that difference. A lot of the early podcar systems are based around actually independent vehicles like small electric cars running on a fixed guideway. However, now what we are seeing is—as you saw from most of our illustrations—the opportunity to build a suspended system and these are very much more like the enlistment park rides and I believe we will see new technology emerging from that side of things. By the way, I want to make one correction while I have the chance. I mentioned earlier that there could be 30,000 vehicles an hour on a podcar system. Images say there's 30,000 people and probably more realistically 20,000 by having six to eight people in a car and not individual cars that frequent of course.

Q. Given the limited energy that photovoltaic solar panels can provide, can you address the energy efficiency of 100% solar power ATN? What engineering numbers do you project for the coefficient of drag and the rolling coefficient?

A. Eric Rosenfeld: We can definitely have 100% solar power ATN by my calculation with around 8 to 10 efficient solar panels. It's around 19,000 placement of panels to supply the North and South campus track and considering the area of the track and the area of the panel, we can actually implement 19,600 panels on top of the transit system with having extra room. The coefficient of drag and coefficient of I believe it was around... I don't have a number remembered...

Buff Furman: If you contact us, we can send you the papers that were written for the aces conference that list those numbers.

Q. That is it seems to me that the critical design issue is that of the station sightings.

A. Buff Furman: Yes, those are critical design issues and we are working on that with our test track this summer.

Ron Swenson: I would like to say a very important difference between our technology and what you see from conventional transit systems is our stations can be much smaller and can reach into spots that you cannot do with ordinary transit especially if it is fossil fuel power—how do you get a vehicle inside of the building? We can move into a building. We can have a very short station or a long station. But if you are using BART, for example, you have 10 cars, 80 feet long each. That's 800 feet, where divide 800 feet? That grade or above grade in urban setting? It is very difficult to find that. In fact, this liberates this and gives many possibilities for station placement. Shannon McDonald's architecture students have done a lot of interesting work on that.

Q. Solar ATN is a great idea, but it hasn't happened due to need for new infrastructure. An alternative ATN design uses existing infrastructure with 1-2 person vehicles that weigh less than the riders. A 25 lb. battery is sufficient, and can be swapped out by robots. The bank of batteries can be charged by solar, wind, or off-peak nuclear or hydro.

A. Buff Furman: That's great. More power to you if you are working on that. We would love to be in contact with you to see those designs.

Q. Pod cars have been concepts since 1953. How are these concepts any different?

A. Buff Furman: One of the key differences is them being solar powered, as we have been presenting and we are also in the super way of a project envisioning suspended vehicles. The five systems that are in current operations are all supportive, meaning they sit on top of a guide way. We think that there are some key advantages when suspending the vehicles. There have been a few in the past under development but what we are planning with solar powered and suspended vehicles is somewhat different than what has happened before.

Ron Swenson: The advancement on technology on the automation side is very dramatic because when the system was designed back in the 1970s, the electronics for the vehicles were very expensive and not as reliable as we have it today. There has been a major impact on this since 1953 with the level of technology that we have available to work with.

Shannon McDonald: I have always been more to leaning at grade or on top of the track until we start to study it with students. Shown in one of our slides, one of the benefits of the suspended system was this issue of topography and connectivity. So while it could be suspended along its main pathway, if it comes off there for a connection to a stop, if there is some topography involved or you create some topography with the pod car hanging, it's that much closer to the ground and creates a relatively easy way for mobility to get on and off a podcar versus if the actual car is on the top of the system.

Q. Are any of the mentioned systems in a coastal area? Any durability issues due to salinity?

A. Buff Furman: Yes, the sunshine bay system is near bodies of water. Heathrow is on an island and gets more coastal effects. I don't know any issues regarding durability, but is a concern for infrastructure for bridges.

Q. How does ADA impact vehicle/station/guideway requirements?

A. Buff Furman: Certainly things that we are considering in the designs of our systems and stations. We very much want these to be ADA-compliant to make these systems accessible for people in wheelchairs and other special needs.

Shannon McDonald: That was one of the comments that I had made about the hanging systems, giving up that capability as well in one of the slides, it was hard to see because of the angle that the student did the rendering, but it was a very small residential station where the cost for putting in an elevator or a system to help the mobility-impaired was really not realistic and so we studied how to take that hanging system down to the ground and we also had an incredibly tight area in which to do that. In looking at how you could bring that system down and back up again in the very small space and have the system still function. That was a very interesting exercise and study and we were able to accomplish it and create a very small beautiful station. There was very good synergy that could happen when you take that approach.

Q. Do you see ATN as a replacement for traditional roadways, or as a compliment to them?

A. Buff Furman: Definitely as it rolls out we see it as a compliment to them. We would like to see ATN more like the iPhone of transit in that it would be more preferred, seeing as that you would not have to own a car, park a car, crash into something. So we see it, hopefully, as a choice people would want to make over owning and moving around in a vehicle but definitely as a compliment.

Ron Swenson: One other point is that the ability to rise above the streets means that it is possible to have a lot more street than the city available for people to use and not just for machines. I would envision that in the outlying areas and rural areas you will still have traditional transportation systems. But in the urban areas, the automobile, the train, the light rail, the trolley, the bus, all of those things are in interference with the dynamics of people living close together and working together. I think we will see a real change in that way.

Q. How do you think ATN will effect cargo transit?

A. Buff Furman: It is very possible that these networks of infrastructure could be used to move cargo both during the day but maybe even more at night when there is less passenger use to move things like cargo, garbage, or other kind of things around the city without having to do that on the public street.

Shannon McDonald: I have asked my students to think about that in their work and it's a bit more complicated from an architecture perspective but the students have been thinking about that challenge.

Q. How do you respond to the comment that "the time for PRT is past now that self-driving cars are on the horizon and getting all the attention?"

A. Eric Rosenfeld: Personally, I see a lot of issues with the self-driving car. No matter how good you have your sensor or how safe you are trying to be, there is always going to be a physics problem, there is always going to be hydroplaning. If you look at the roads nowadays, there are 900,000 people dying, and 25 million being injured. We are trying to get people off the road and with the self-driving car, I don't see physics abiding by safety.

Shannon McDonald: I have been studying for several years now the impact of the automated car in the urban environment and once people have that type of technology at their disposal, there will be whole new expectations about how they will engage with the urban environment. Our roads and our current cities are not constructed for those expectations to be met, meaning that they are going to want to be dropped off right at their front door. If you are in a vehicle, that can happen if everyone is going to work approximately within the same time frame. From my perspective, looking at other mobility such as transit-type systems that offer the same door-to-door type of mobility makes a lot of sense. It is not the traditional transit in the sense that you sit on a bus and go stop to stop to stop. You actually get in a pod car that takes you the point of start to the point of end, and so it is a real visionary transit system that gives you the same type of mobility that has realistic capability to do that.

Ron Swenson: We think that what will happen is that this experience of riding in a podcar will be better than the experience of riding in an automobile. How many people will be able to afford this luxury car with all the fancy automation and then furthermore, how are you going to provide the space? As I showed in my first couple of slides, the automated car still has to ride on an ever more widening freeway. How many lanes do we pave before we figure out how this technology of four wheels as the future?

Shannon McDonald: Those who have been looking at the automated vehicle have also really begun to understand that it has the potential to really increase the vehicle miles traveled due to the capability they can provide people who do privately own their own vehicle so that it is in constant motion. If you look at it from a shared Uber perspective, that may be one way to think about it. That still does not provide all of the connectivity that we are able to get with an automated transmission network for people.

Q. Suspended and solar panels over the guideway moves the wind sail higher on the structure. How do you deal with hurricane side wind load raising the panels so high on the beam?

A. Buff Furman: That's an analysis that we need to do as we are working on the connections between the solar panels and the guideway. There is nice development work being done with solar panels that are flexible and could be bonded to surfaces that could make them less of a sail. That is a good point and question that we do need to answer.

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