Solar Power on Rails

A review of challenges for urban mass-transit and a possible hybrid solution

By Dale Jaedtke

Imagine a rapid and reliable transit system that spurs economic growth, creates equitable access and ensures environmental protection.

The impact of transportation on the planet is significant and growing. There are solutions out there to address a variety of concerns, from pollution to efficiency to convenience. But is there one that addresses multiple problems?

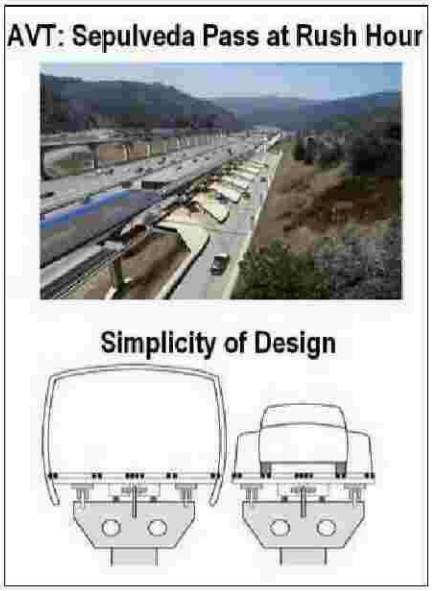
When it comes to surface transportation in urban areas, an innovative solution, SolaTrek is gaining attention. The concept combines the convenience of the personal vehicle, with a high-speed, nonstop rail system powered by solar energy.

Let's take a look at it, but first, for background data we'll look at numbers gathered from one of the nation's busiest metro areas, Los Angeles, California and the 101 freeway corridor that runs through it.

Current Condition

Motor vehicles are the most common form of transportation and the source of a great deal of our current problems, among them air pollution, gridlock, noise, expense, safety and land use. Nationally, two or four lane roadways make up the bulk of the infrastructure needed for this means of transport. Since many urban centers are built out, there is a great deal of infill and redevelopment being done to make better use of the land, which creates more traffic on the same roadways. Proposals have been made to widen or double-deck such highways to deal with the increased traffic pressure.

When widening a roadway you have to include the width of the added lanes (about 12 feet per lane), the width of the necessary slope-to-grade as well as the maintenance access area for the slopes. A typical, on grade, six-lane highway would be approximately 153 feet wide, not including on-and-off ramps. Under ideal conditions, an average highway lane will accommodate approximately 2000 vehicles per hour, traveling at 65 mph. The amount of average daily trips per month is 308,000.



Trains (Amtrak) or heavy rail can be run in both directions on the same track using sidings to accommodate opposing trains. The original easement for train tracks and the right-of-way was 100 feet and most were placed on grade. In some areas, the right-of-way is as little as 33 feet with double tracks, but that is the exception. When trains share the same track, scheduling becomes an issue and adds more time to the commute.

A typical Amtrak train set consists of one locomotive and five to six passenger cars and each car can carry 90-seated passengers. Average ridership for Amtrak passenger trains is approximately 241,571 riders per month. Amtrak's Los Angeles corridor is the second busiest in the system and runs at an average speed of 42 miles an hour.

Local commuter trains such as Metrolink or light-rail systems will use existing train tracks rather than their own tracks most of the time, which means arranging their schedule around the heavy-rail train schedule. A typical commuter train set consists of one locomotive and three to six passenger cars.

SolaTrek presentation to Engineers at Boeing Educational Training Center in Canoga Park, California

Each bi-level car carries approximately 162-seated passengers and costs about $1.3 million. Ridership for the light rail system averages about 88,750 trips per month. The average speed is around 41 miles per hour.

One of the problems with commuter trains is that the traveler has to get to and from the station or terminal. If this means driving a car, it will have to be parked, provided there is a space. That creates a potential need for a parking lot or ramp and that means more land will be used around the station or terminal. It also creates a need for some form of transportation at the end of the train ride to get to the ultimate destination.

A Hybrid Solution

An innovative solution to address increased traffic congestion and parking issues has been developed by SolaTrek (www.solatrek.com). It is a concept that seeks to solve problems without changing people's habits. People can still use their vehicles but in a more efficient manner.

SolaTrek uses a new maglev (magnetic levitation) technology that operates over guideways, which serve the same purpose as a set of tracks. The trains are powered by solar panels on top of the transport cars. Each transport car would cost approximately $100,000. Because of the type of propulsion, there is no need for expensive components throughout the guideway, which makes it less costly to build. Currently, construction is estimated at $50 million per mile for the guideways, stations, shuttles and trains.

The network has departure and arrival stations located along the route. Vehicles are put on transfer shuttles, which run on a separate guideway, and transferred onto the passing SolaTrek. Rather than stop at each station, the SolaTrek's are continuously running on two, opposite-direction guideways at 80 mph. Each guideway could transport 10,000 cars per hour (equal to a five lane highway) because the trains don't stop. Furthermore, the speed could also be increased up to 250 mph between stations.

The SolaTrek addresses a host of issues. Travelers maintain the use of their own vehicles, there's no need for parking, and it's cheaper to get from point A to point B in a faster, more relaxing, less polluting, safer, quieter fashion. The system can handle more capacity, and uses less land.

The arrival/departure stations and guideways can be built over the existing roadways. The width of the guideway is about eight feet and the width of the cars are about 13 feet. This width allows for placement of the guideways, which are typically elevated, over the center median or the shoulders of existing roads. The guideways and supports can be made offsite, trucked in and installed, which controls costs, causes less traffic disruption and offers faster completion time.

The elevated-guideway design uses less land than at-grade systems. Drainage concerns are negated. Only minimum earth work is necessary and the effect on existing roads is minimal. The solar technology means lighter weight dispersed over a large area, which requires fewer support columns. An elevated guideway is also more secure from intrusion.

Another advantage of the SolaTrek is that it can be privately funded (which would make it less costly to build and maintain) and paid for by the people that use it rather than federal or state tax dollars.

This concept could be the answer to a host of problems. **SLDT**

Facts and figures gathered from the following sources:

The California Department of Transportation www.dot.ca.gov
Amtrak www.amtrak.com
Metrolink www.metrolink.com
SolaTrek www.solatrek.com

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Images courtesy of SolaTrek